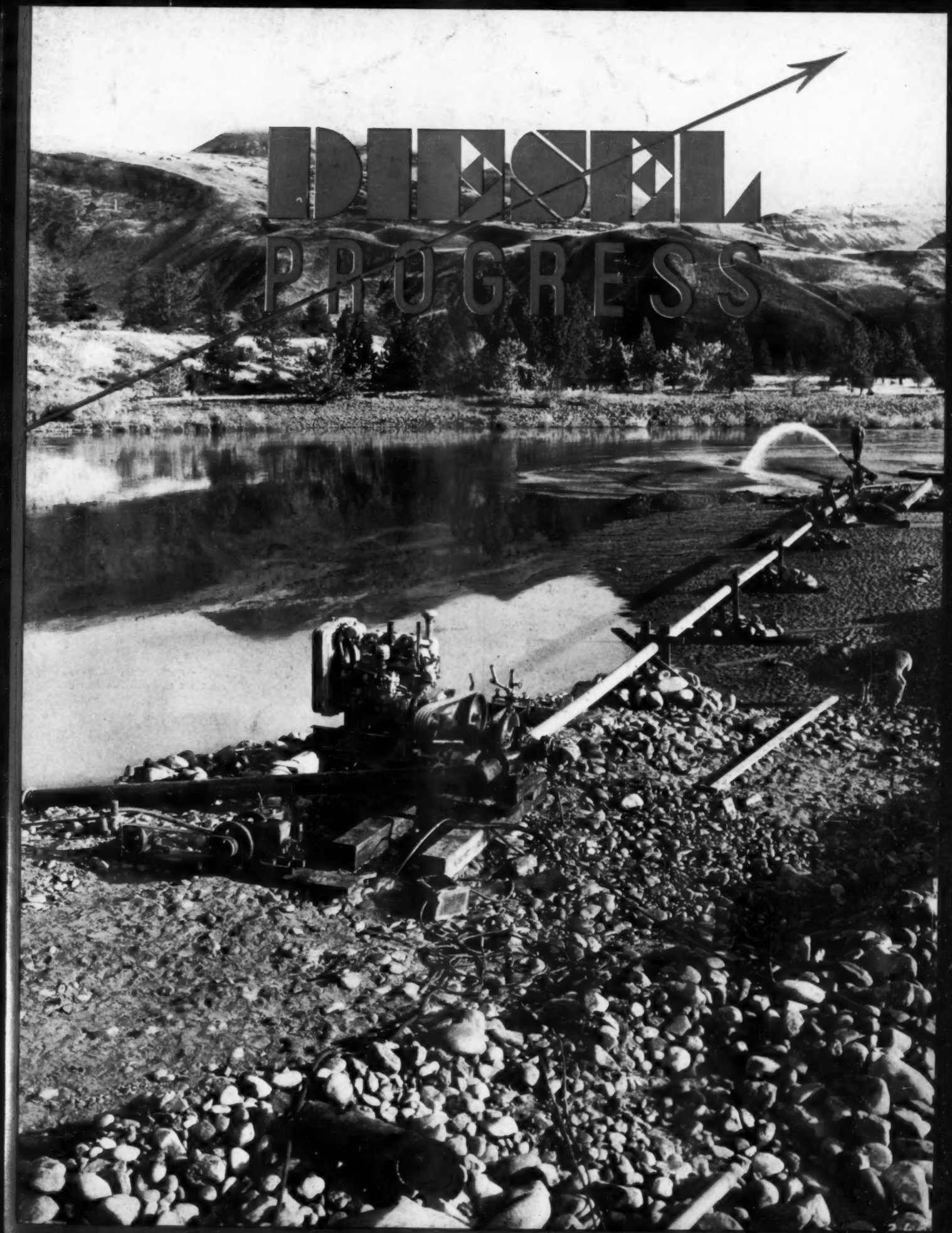
DIESEL PROGRESS



IN INDUSTRY • ON THE FARM • IN TRANSPORTATION • ON THE SEA

MARCH, 1939 CIRCULATION OF THIS ISSUE—IN EXCESS OF 14,000 COPIES 25c

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DIESEL PROGRESS and DIESEL AVIATION

CONTENTS . MARCH

REX W. WADMAN
Editor and Publisher

CCA

FRONT COVER ILLUSTRATION: A Caterpillar Diesel engine powering an eight inch centrifugal pump to hyd. monitor with three inch nozzle, washing away tailings from gold washing plant on the Salmon River Canyon near Riggins, Idaho.

TABLE OF CONTENTS ILLUSTRATION: A Universal crushing plant at Oxford, Michigan, powered with a Caterpillar Diesel, operates sixteen hours daily on three gallons of 7.1c fuel per hour. Average output of plant is 75 yds. per hour, saving $10.45 per day over former power costs.

DIESEL PROGRESS for March, 1939, Vol. V, No. 3. Published monthly by Diesel Engines, Inc., 2 West 45th St., New York, N. Y. Tel. MUrray Hill 2-5092. Subscription rates: U.S.A. and Possessions, $3.00 per year; 25c per copy. All other countries, $5.00 per year; 50c per copy.

The Twin Coach Super-Twin, Diesel-powered, in Akron, Ohio.

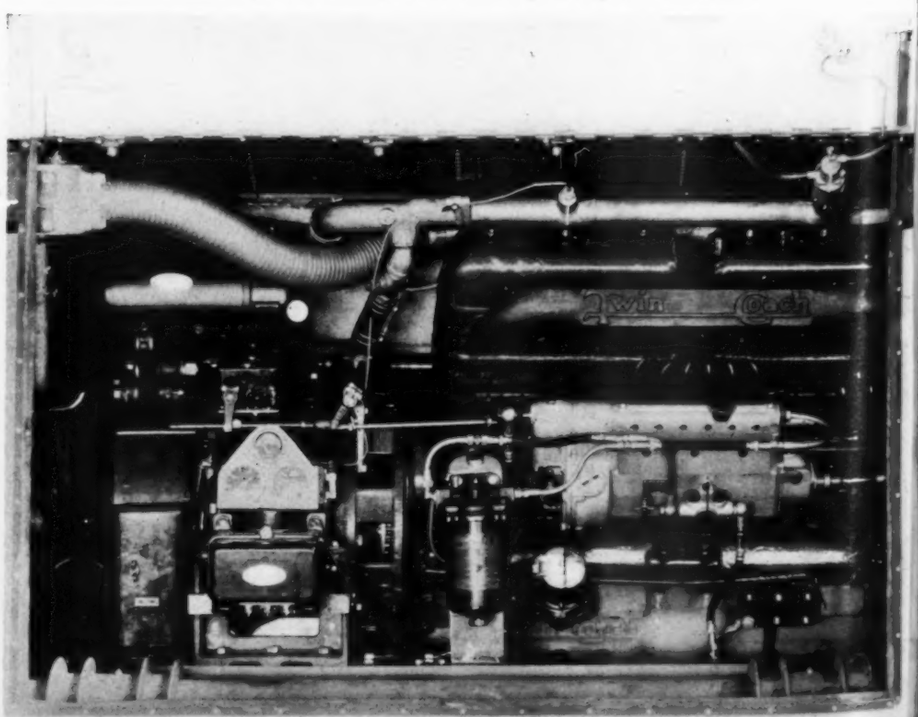
NEW DIESEL BUSSES FOR PHILADELPHIA

By WILL H. FULLERTON

THE Philadelphia Rapid Transit Company recently awarded contracts for approximately $325,000 worth of new bus equipment. Included in this purchase were ten Model 35 RDE Twin Coach busses. These vehicles seat 35 passengers and are equipped with the Hercules Model DXRB Diesel engine. The busses are also equipped with electric drive, nine vehicles using General Electric Company's equipment and one vehicle using Westinghouse Electric Manufacturing Company's equipment.

Four Model 740 General Motors busses were also bought. These vehicles seat 40 passengers and are equipped with the General Motors Model 6-71 Diesel engine. The busses are also equipped with the recently developed General Motors hydraulic drive.

Hercules Diesel engine as installed in the Philadelphia Rapid Transit busses.



Interior of the new Twin Coach Super-Twin Diesel bus.

In addition to which eighteen Model 31-S ACF coaches were purchased. These vehicles seat 31 passengers and are equipped with the Hall-Scott Model 130 gasoline engine.

There is a widespread interest in Diesel busses as is evidenced by this purchase by the Philadelphia Rapid Transit Company. To cater to this increasing demand the Twin Coach Company has recently developed a 56 passenger bus, 47 ft. in length, which operates in traffic as easily as a pleasure car. This unit, designated as the Super-Twin, has been demonstrated successfully in numerous cities throughout the nation during recent months and is illustrated above.

The propulsion equipment consists of a Diesel engine, an electrical generator and two electrical propulsion motors. The engine and generator are coupled together and are located transversely at the rear of the coach in an insulated engine compartment, entirely isolated from the passenger compartment so that no noise, heat or obnoxious odors annoy the riders. The Diesel engine is a Twin Coach-Hercules, specially designed for this equipment, having a displacement of 707 cubic inches and delivering 175 hp. at 1,800 rpm. The electrical propulsion motors are located underneath the floor, one ahead of the front center axle and one to the rear of the rear center axle.

Contrary to first impressions, advanced engineering has so simplified the operating mechanism that required manual effort has been greatly reduced, thereby lessening driver fatigue. Steering and maneuvering are simple matters due to the synchronous steering linkage combined with the air power.

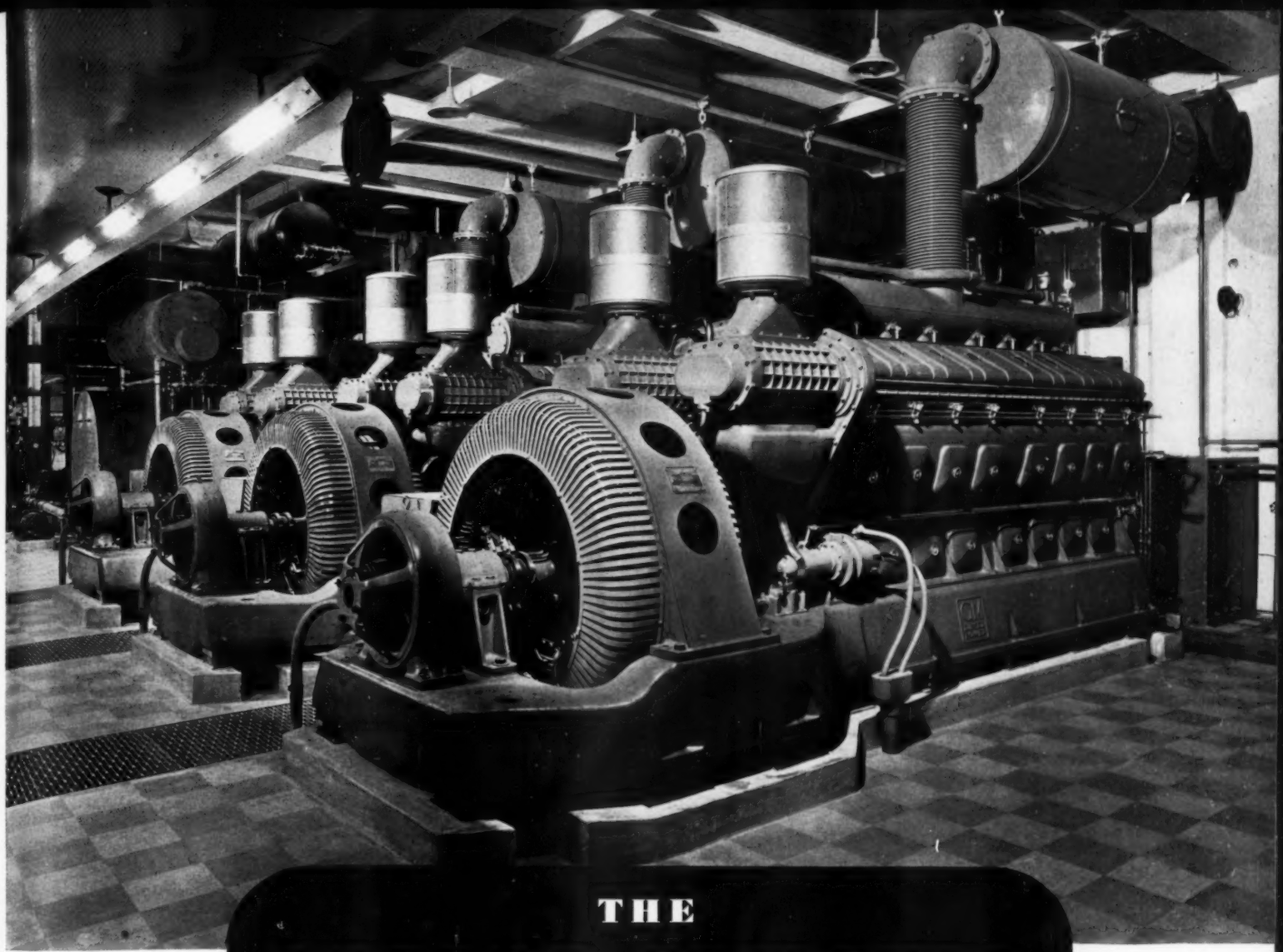
Designed by Frank R. and William B. Fageol, President and Vice-President respectively, of the Twin Coach Company, it includes original features destined to change the urban transportation viewpoint in the nation's larger cities. Having the capacity of a street car, yet operating on pneumatic tires and utilizing a self-contained Diesel propulsion equipment, expensive steel rail and pavement maintenance are dispensed with and large trunk line investments eliminated, which, in turn, materially reduces unit operating costs. Capable of a speed of 50 miles per hour, it is a fast, quiet, mobile unit not confined to the center of the street rails and capable of passing slow moving and stalled traffic, eliminating street car congestion and the resulting damming up of automobile progress.

Exterior of one of the Twin Coach Diesel busses sold to Philadelphia Rapid Transit Company.

BUILT last year for Harkness Edwards of Lexington, Kentucky, this handsome auxiliary yawl took part in the annual club cruises last summer and made frequent short trips from East Hampton, Long Island. She was designed by Sparkman & Stephens, Inc., of New York and constructed at the yard of Jakobson & Peterson in Brooklyn. *Wakiva* measures 70 ft. 3 in. in length overall, 49 ft. 6 in. in length at the water line, 15 ft. 2 in. beam, and 9 ft. draft. Auxiliary power for maneuvering and for propulsion in calm weather is supplied by a Buda 4-cylinder Diesel engine. Above is a view of the forward deck and the dog house is shown below with the instrument panel and radio compass.

"WAKIVA"

A symphony of trim lines and smooth motion under full sail is this Diesel auxiliary yawl.



THE DUPONT BUILDING IN MIAMI

DEISELIZED
AIR-CONDITIONED
POPULAR

By REX W. WADMAN

A NEW chapter in Diesel progress was started when the three 1,050 hp. General Motors 16-cylinder, 2-cycle Diesels went on the line in the Alfred I. duPont Building in Miami a few days ago.

The largest office building ever to depend entirely for all its light and power requirements on a Diesel power plant. The first large office building to incorporate two such modern conveniences and tenant drawing features as air-conditioning and Dieselization. The duPont Building, located at the corner of Northeast Second Avenue and Flagler Street in Miami, Fla., sets a new and fast pace for other building owners and operators throughout the country, opens a new chapter in modern building construction and operation, pioneers a new market for Diesel engines, one which will expand with great rapidity – the advantages are

The Alfred I. duPont Building in Miami which is completely Dieselized.

so obvious, the savings in operating costs so tangible.

This new building is air-conditioned from top to bottom, including all its stores, banking rooms and offices, even unto the 400-car garage which immediately joins the 17-story structure. The bank which will occupy the second floor of this building is the Florida National Bank & Trust Company, and access to this second floor is by escalator, stairs and elevator and offering for the convenience of customers all banking facilities on one floor.

Typifying the extent of the modernity of the building is the power plant, which is Dieselized. All of the power requirements of the building, of the elevators, of the stores and of the air-conditioning equipment, plus of course the light requirements, are taken care of by the Diesel power plant which is described in detail hereunder.

The plant which this Diesel installation serves consists of the main 17-story structure, 266 ft. high, including six stores, plus the adjoining 400-car garage with its eight stores. This new bank building is the second highest building in Miami and is, by far, the largest office structure to be erected here in twelve years.

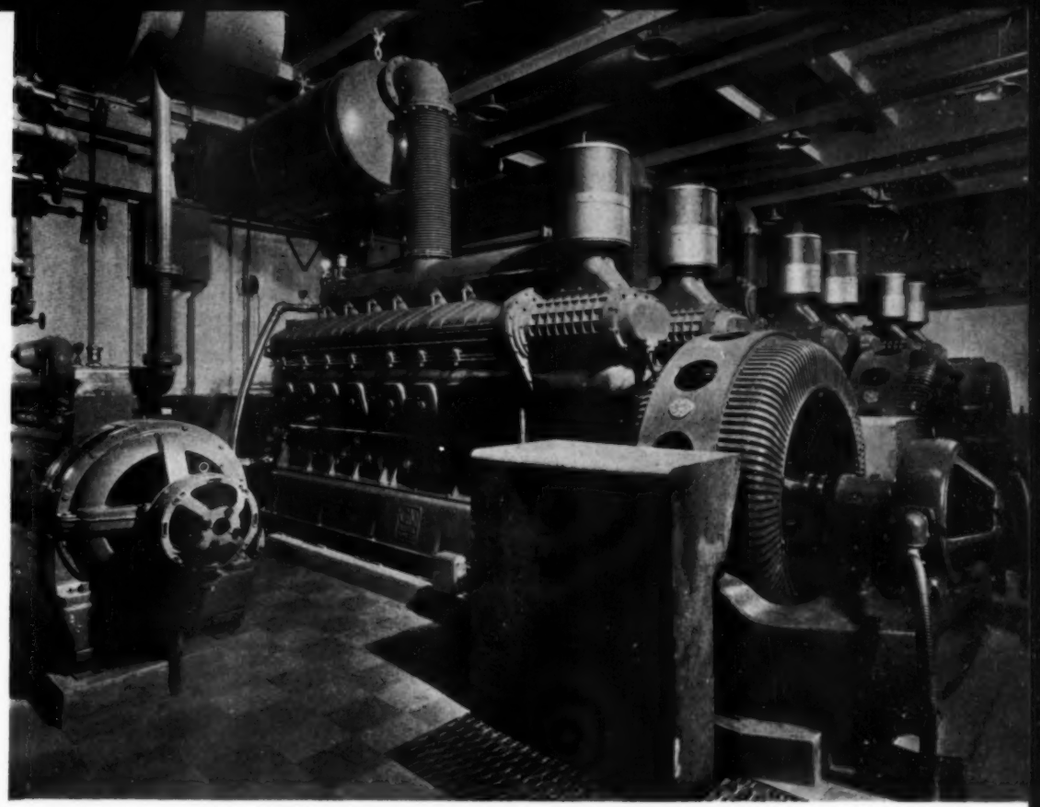
Marsh and Saxelbye, Jacksonville, and Messena & duPont, Wilmington, Del., were the architects for the building and Miller Electric Co. the consulting engineers on the power plant. George A. Fuller Construction Company of New York were the general contractors.

The Diesel power plant and air-conditioning equipment are all located in a sound-proof room on the ground level, and a great deal of thought and care has been expended to completely isolate this room against the rest of the building for both noise and machinery vibrations.

All in all, this building represents a real advance in construction, and offers its tenants the last word in comfort and convenience.

The Diesel power plant consists of three main engines: 16-cylinder General Motors, 2-cycle Diesel engines, bore 8½ in., stroke 10 in., rated at 1,050 hp. at 600 rpm. These engines are all of the standard General Motors 2-cycle line of production engines rated for heavy duty, medium speed service, each unit complete in itself with integral blowers, unit injectors for each cylinder, attached water, lube and fuel pumps, so arranged that when erected upon the foundation all connections can be readily made.

The auxiliary engine installed, to take over the night and Sunday load is an 8-cylinder General Motors Diesel, 4-cycle, bore 5½ in., stroke 7 in., rated 225 hp. at 1,200 rpm.



General engine room view showing the eight-cylinder auxiliary engine and the three main engines.

The main generators are General Electric 700 kw. 208/120 volt, 3-phase, 60-cycle, 4-wire with direct 125 volt exciters. The auxiliary generator is 150 kw. General Electric unit to the same general specifications.

One of the most interesting points in connection with this installation is that all four engines, the three big ones and the auxiliary are electrically started. We do not believe that there is in existence, in this country, at least, a power plant consisting of three 1,050 hp. engines electrically started. In this particular instance, a 64 volt Delco Remy electric starter is used on the three main engines, and a smaller unit of the same make on the auxiliary engine. This simple method of starting eliminates, of course, the standard method of air-starting with its attendant complications.

Power to operate these electric starters is provided by eight Exide eight-hour capacity batteries, rated at 385 ampere hours. These batteries, also, serve the purpose of supplying electricity for the emergency lights throughout the power plant should all engines fail. The Tungar charging unit adjoins the batteries, automatically maintaining a full charge on the batteries from the exciters. A Clark controller is also installed in the battery room to handle the engaging and disengaging of the starting motors.

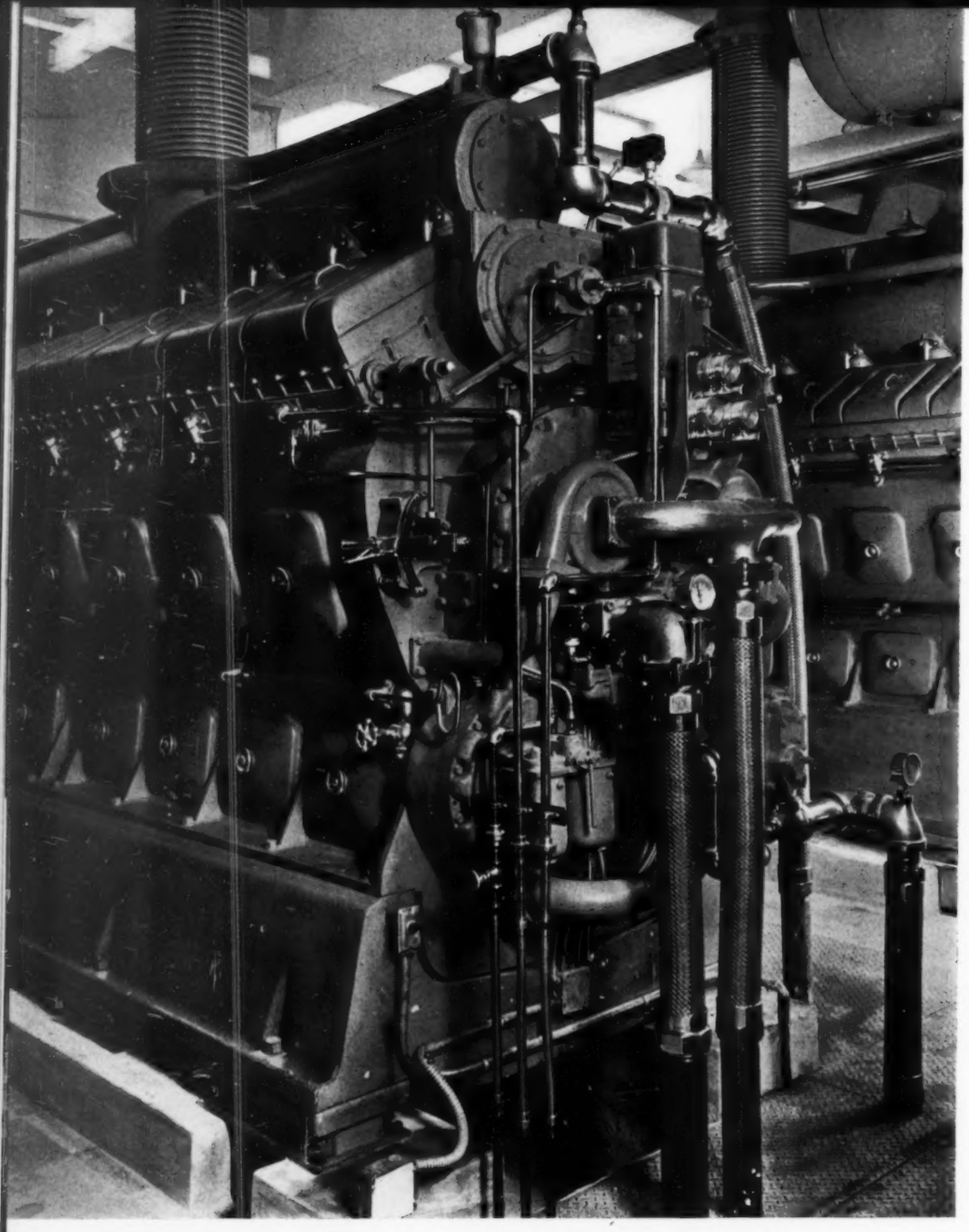
A switch button for the electric starter on each engine is maintained in the forward end of the engine for the convenience of the operators.

Installed in a room, amply large enough for the requirements, every necessary accessory has been put in to make operation of these engines highly efficient, yet simple.

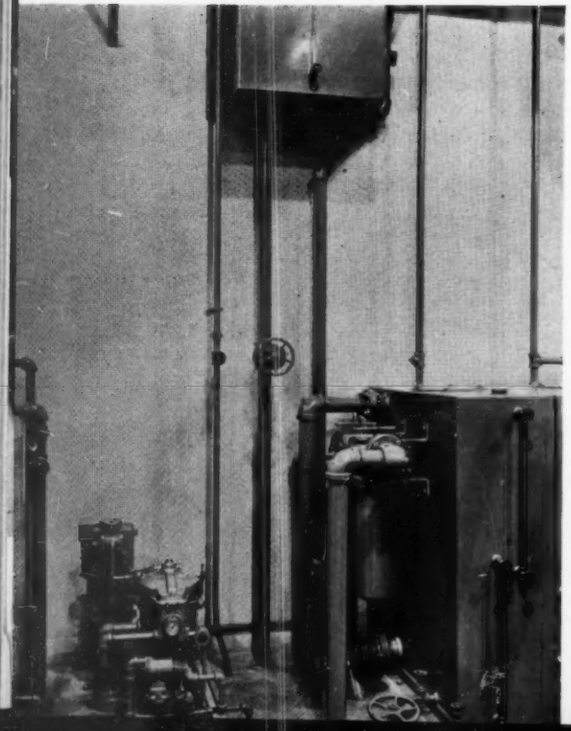
There are no frills or furbelows about this installation, it is simple, compact, business-like and splendidly serves the purpose for which it was designed.

The room, itself, as may be seen by the illustrations, is beautifully designed, entirely soundproof and permits immediate accessibility to both main engines and all necessary accessories.

Getting down to details the main fuel oil storage tanks consist of two 3,000 gallon units buried in the area-way. A Viking transfer pump takes the fuel from the main storage tanks for the day tank for each engine; from the day tank the fuel passes through a duplex Purolator fuel oil filter, through a small Purolator in the fuel oil manifold, then to the unit injectors on each cylinder, in which is also located a small Purolator edged-type filter — thus, insuring clean fuel delivery to each injector.



Forward end of one of the main engines showing Woodward governor, Purolator filter, Motoco thermometers. At left — Purolator duplex filter attached to day tank and one of three Hydroil lube oil centrifugals.



There is a 500 gallon lube oil storage tank from which a Viking transfer pump serves a lube oil day tank for each engine. The lube oil passes through two filtration processes before reaching the engine, an edged-type and a cloth-type, both of Purolator design. From the engine the lube oil is transferred through a Goulds Hydroil Centrifugal and thence back to the tank.

The engine cooling system is of the closed-type with an expansion tank for make-up. Three Harrison Radiator Heat Exchangers are installed in connection with each engine, one handles the lube oil for each engine, the second handles the domestic water and the third handles the engine water. The flow is from the Foster Wheeler cooling tower through the lube oil and engine water exchangers back to the tower — the other flow is from the city water supply through the second heat-exchanger, and thence to the domestic water heater for the building. In other words, the heat from the jacket water is used to boost the temperature of the domestic water heater supply, thereby, saving an estimated average of 1,000,000 Btu. per hr. The Foster Wheeler cooling tower of 2,400 gallons capacity, incoming water at 102.5°F., outgoing water a 90°F., with wet bulb of 79°F., is located on the third floor of the garage and answers a dual purpose — that of cooling the water from the heat exchangers and also from the Carrier air-conditioning equipment. The supply to and from the cooling tower is thermostatically controlled, maintaining an average outlet from the engines of 140° and also maintaining a good heat balance throughout the plant.

In view of the fact that the air conditioning equipment and the Diesel engines will be worked hard during periods of warm weather and no wind, it was necessary to install a cooling tower capable of operating at a high capacity under adverse conditions. Hence the selection of a forced draft type of tower, because, essentially, the operating conditions here combine high temperature with high humidity and frequently little or no wind. In this case, the cooling tower was located on the third floor of the garage and so close to the 17-story office building itself that a forced draft was essential, giving, as it does, control of the capacity of the tower to the operating engineer.

The piping for all engines is installed on the unit system, each engine having its own piping, fuel and lube oil supply and return to the storage tank. The same type of system is utilized for the cooling water. All piping is carried in trenches with grating over for complete accessibility. All valves and fittings are Crane.

The exhaust from the three main engines and from the auxiliary engine is led through a Burgess snubber type of silencer and from there into a common manifold leading to the brick stack extending the entire height of the building.

All air entering the engine room is filtered both before and after leaving the big American blower fan which is located on the balcony.

Each main engine is equipped with two large

air intake silencers, as can be readily seen in the illustrations. No air is re-circulated within the engine room—the air not utilized by the engines for combustion is exhausted by means of an exhaust fan located at the rear of the engine room.

The switchboard, entirely of General Electric manufacture, extends the full length of the engine room, and is lighted with a line-of-light. It is of the dead front type. Each generator panel being provided with all instruments for the particular unit—rheostats are motor operated for the generators and hand operated for the field. An unusual feature of this board is the "U" type buss construction, made necessary by the heavy current carried. This construction eliminates the multiplicity of the copper bars from the board and within the engine room. All motors throughout the working area of the building are controlled with remote switches located on the switchboard. These controls are of the push button type with red and green indicator lamps.

For measuring the electrical energy produced, the switchboard is equipped with recording General Electric voltmeters and ammeters, power factor indicators, frequency indicators, totalizing and recording watt hour meters. On this same board is mounted a Telechron Master electric clock which controls in connection with the frequency control all of the electric clocks throughout the building.

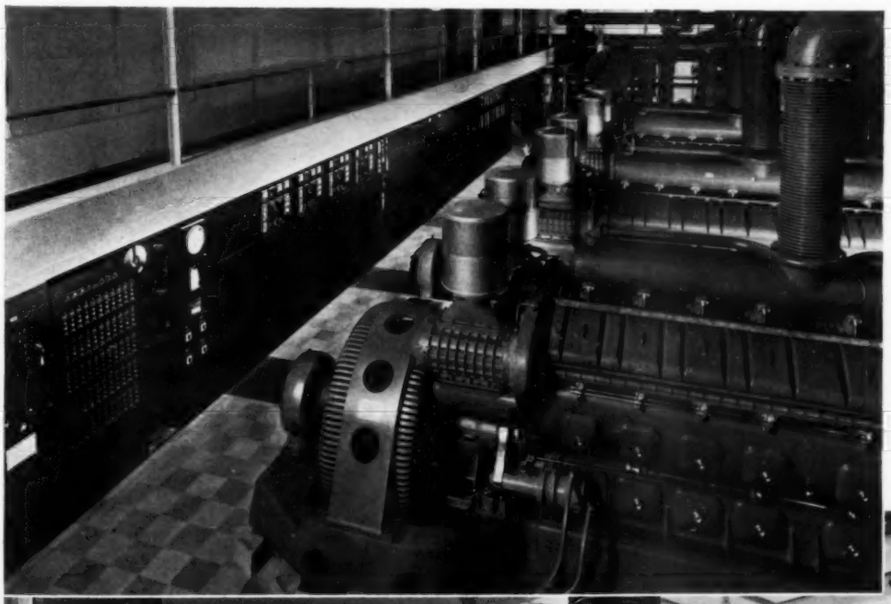
Each generator is provided with a General Electric voltage regulator and each of the three main engines and the auxiliary engine, are equipped with a Woodward governor which effectively controls the speed and frequency.

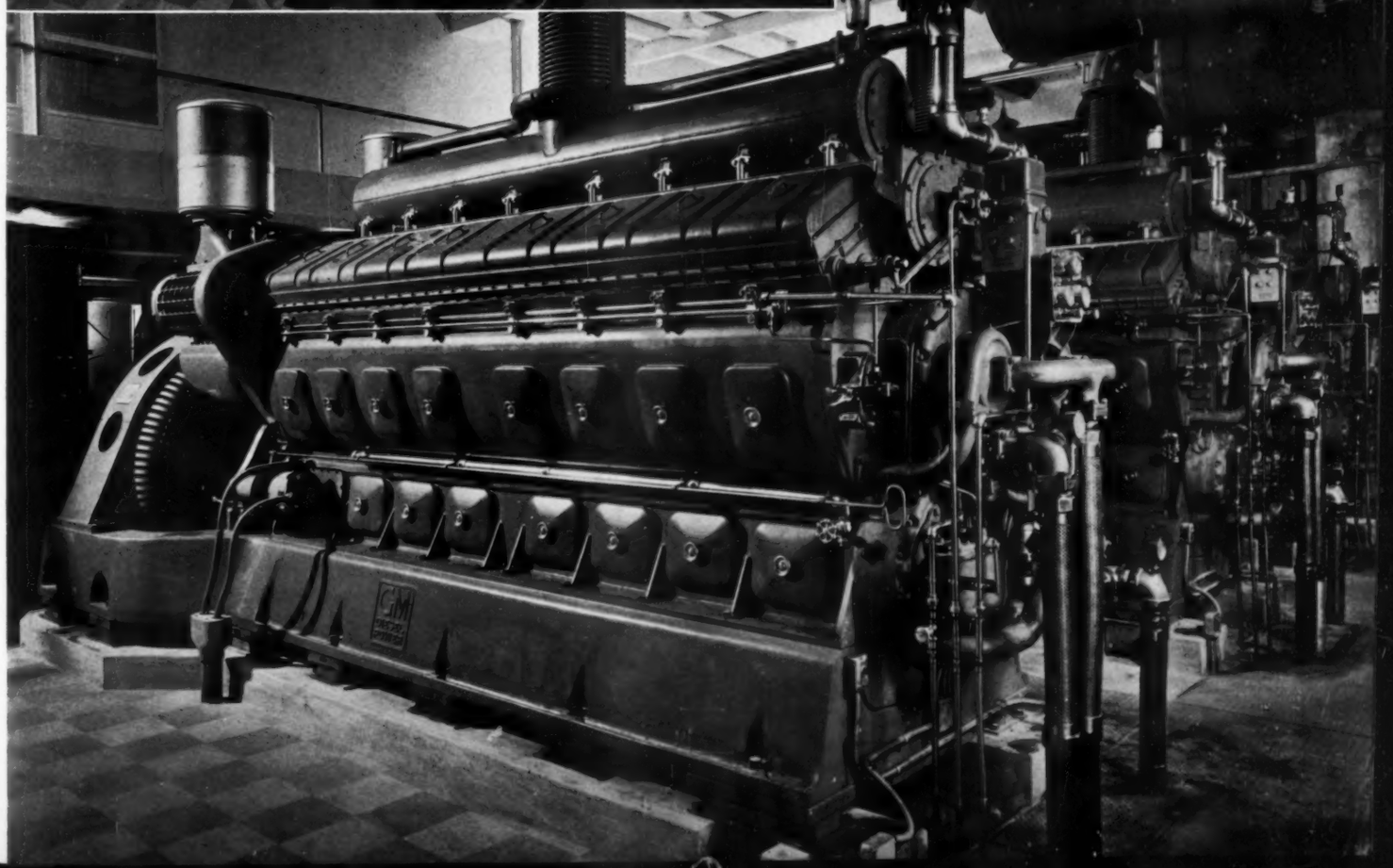
A Brown pyrometer is mounted on the switchboard and is equipped with three 16 point selector switches and one 8 point selector switch, thereby serving all 56 cylinders.

The entire engine room is sound-proofed by means of a 2½″ blanket of sound-proofing attached to the walls and the ceiling, over which is laid perforated Transite blocks supplied by the Johns-Manville Company. The floor is another unusual feature of this building, being of special marble laid with close joints, and of 12″ x 12″ blocks.

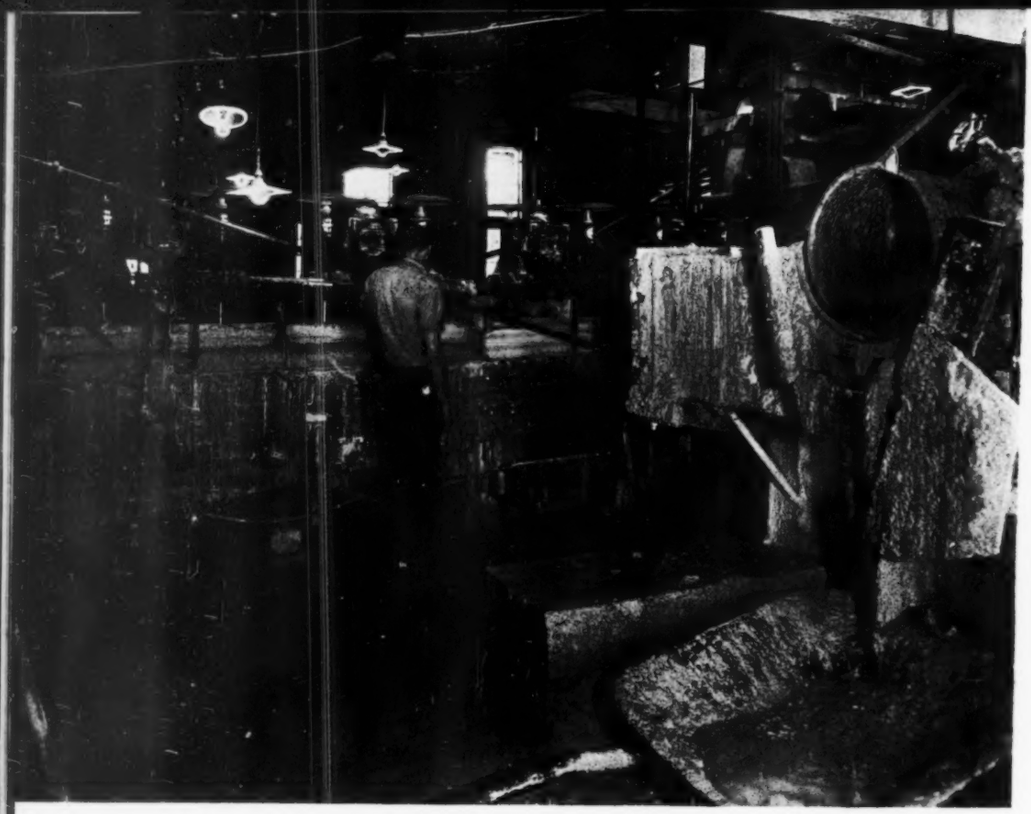
A 6 in. I-beam is located over each group of cylinders, to which a block and tackle or a chain fall can be attached for the removal of

. . . . *And now please turn to page 50*





Main switchboard, a General Electric product. Below—General view of operating end of three main engines showing general use of Penflex flexible hose connections on all water, lube, and fuel lines.



Interior scene at the Tungsten Metals Corp., 47 miles S. E. of Ely, Nevada. Caterpillar Diesel engine driving 100 kva. General Electric generator to supply current to power plant.

TUNGSTEN MINE SAVES WITH DIESELS

By GEORGE D. CROSSLEY

ALMOST every machinist, 45 years of age or more, can remember the days when machines were equipped with ordinary straight carbon tools, which would soften and burn down from frictional heat developed from the cutting operations. This fault placed a definite and narrowly defined limit upon productivity. Later, Mushet steel was introduced as the first steel carrying a small percentage of the metal tungsten. This first venture stepped up the productivity of a given machine tool operation by as much as 100 per cent.

In the old days, a plain carbon twist drill would have been ruined if operated in average cast iron at above 45 ft. per minute cutting speed. Today, a good high-speed drill can operate in cast iron continuously and without damage at speeds in excess of 150 ft. per minute with corresponding increases in feeds.

In other words, it is now possible to drill in four minutes 15 or 20 holes in metal, as against a former four holes per hour. This same performance is common in all other machine operations, and is the primary reason why one may now buy a fine automobile for a few hundred dollars, which would have cost thousands a few years ago.

During World War years, the importance of tungsten was fully realized, and large quantities of the metal were sold at from $3 to $5 per pound. Today, the highest grade of tungsten can be purchased at a price of about 75 cents per pound base.

Methods of producing the metal have been improved and made much less expensive, but producing mines are constantly on the lookout for still cheaper and more suitable sources of power. The Diesel engine, as a result, fits well into the operations, and many important mines have turned to this type of power.

The Tungsten Metals Corporation of Ely, Nevada, has installed a Caterpillar V-8 Diesel engine on its property in Shoshone, Nevada. The engine is producing electrical power to operate a modern, 100-ton gravity and flotation mill. The equipment started operating on January 1, 1938, and they have kept actual records of production and costs since that time.

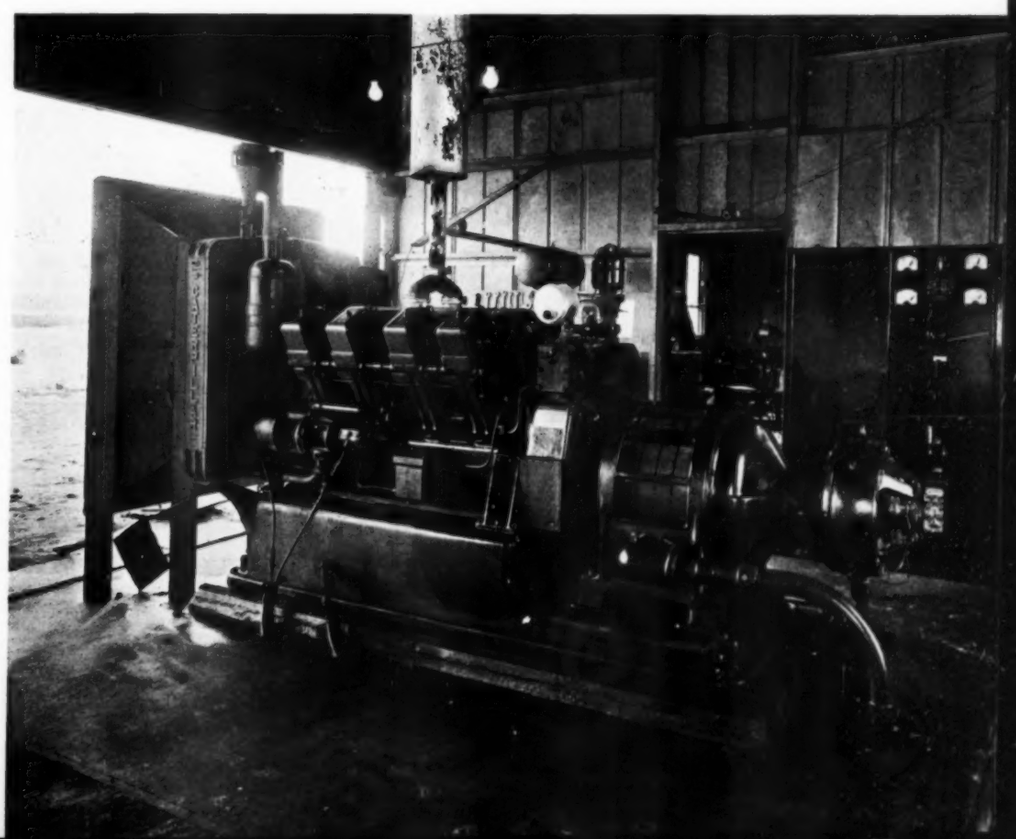
Their record at June 30, discloses the following costs:

Kw. hrs. produced	*273,200*	*Cost per kw. hr.*
Fuel oil, 29,550 gals. @ 9c.	$2,709.15	$.00991
Lub. oil, 1,074½ gals. @ 62c.	665.45	.00243
Depreciation, 4 years	1,200.00	.00440
Repairs, est.	500.00	.00183
Miscellaneous	33.27	.00012
Insurance and taxes, est.	240.00	.00088
Total	$5,347.87	$.01957

Because tungsten has proven beyond any doubt to be the most versatile mineral mined, there is a fairly constant demand for it. Its high resistance to heat, and the fact that it has the highest melting point of any known mineral, makes it invaluable as filaments for incandescent lamps and radio tubes, and for all sorts of electrical contacts.

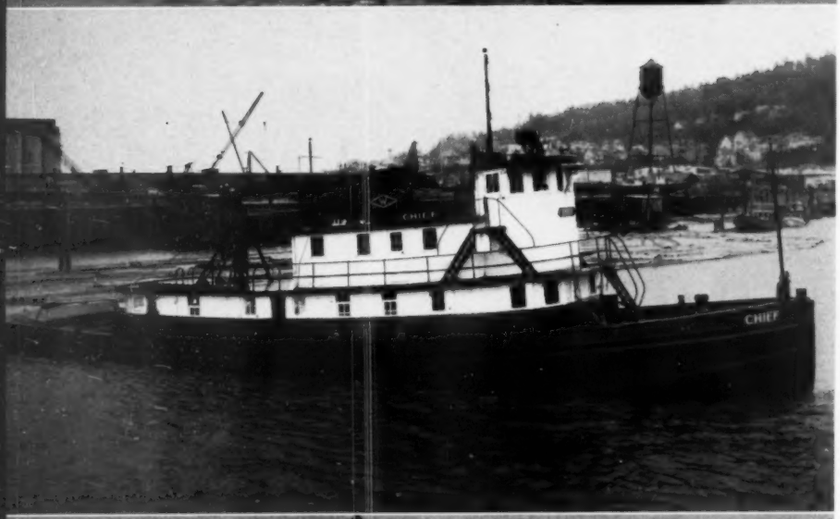
To supply this varied demand, the Tungsten Metals Corp. has a heavy work program, and the Diesel engine, operating an 80 kw. 60-cycle, 3-phase 240/480 v. General Electric generator, ran 4,259 hours out of a possible 4,320 hours during its first six months of operation.

Caterpillar Diesel engine driving 100 kva. General Electric generator 80 kw. 80% PF working 24 hrs. a day to supply 440 v. A.C. current to power plant of Tungsten Metals Corp., Ely, Nevada. Engine works 90 to 92 kw. load an average of 6 hrs. a day—the remainder is on about 75 kw. load.

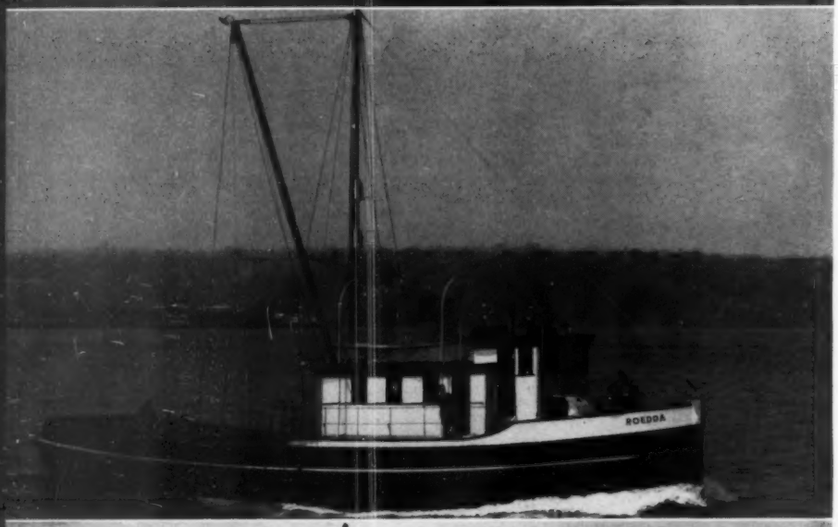


The "John H. Colle" is typical of a fleet of three Atlas Diesel powered vessels operated by the Colle Towing Co. of Pascagoula, Miss.

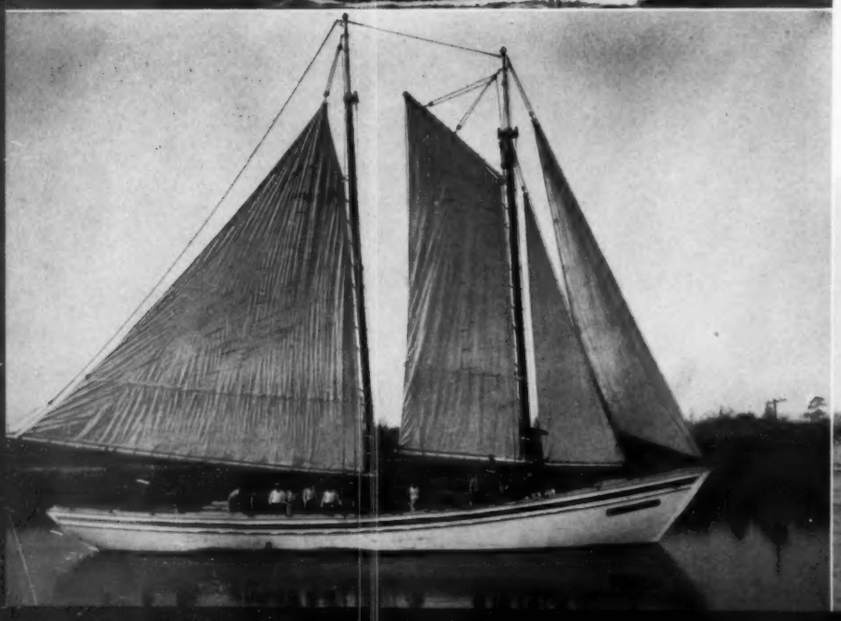
The "Henry Gray" is one of a fleet of four Atlas Diesel powered tow boats operated by the Clooney Construction and Towing Co. of Lake Charles, La.



The "Chief," largest of a fleet of nine Atlas Diesel powered tow boats operated by the Crown-Zellerbach Corporation on the Columbia and Williamette rivers.



The "Roedda" is one of twenty-two boats in the Alaskan fleet of Libby, McNeill & Libby in which twenty-three Atlas Imperial Diesels are employed.



The "Baby Ann" is typical of a fleet of eight Atlas Diesel powered boats operated by the Star Fish and Oyster Co. of Mobile, Alabama.

The "Hercules," latest addition to the fleet of the Sabine Towing Co. of Port Arthur, Texas. In six years this operator has purchased twenty Atlas Diesels.

ATLAS DIESELS ARE OWNER'S CHO

An old sea captain once obser... 'Damn that dog.' But if the same d... me.'" That same philosophy seem... work boat fleets. It's only a fool w... buys the

When you contemplate the purch... of a Die... from some of the large fleet owner... o have ... sistently over a period of years. Gr... d, that ... take once—it isn't conceivable th... would ... five—ten—fifteen—twenty—twen... ve times

Fleet operators who have once b... ne accu... ception of Dependability, Econom... d Servi... afford to experiment—so they sta... rdize on... they have many boats over whic... spread ... they are unwilling to take a flyer.

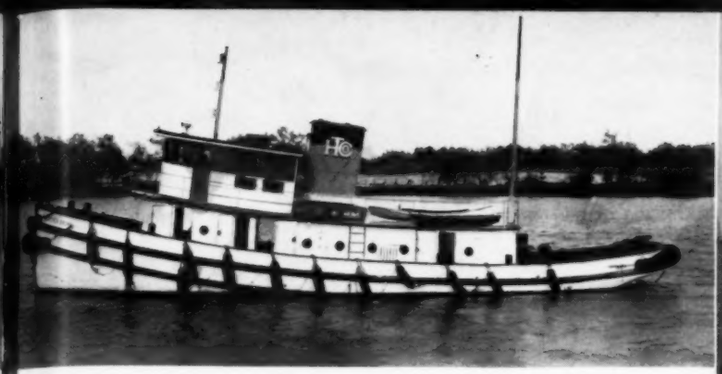
When the choice of motive power... hat impo... many boats—it can spell success o... nation t... boat. If you are staking your life's s... gs on o... to gamble. Bank on the experienc... those w... Buy an Atlas Diesel and be sure.

ATLAS IMPERIAL DIE... ENG...

Eastern Division
115 BROAD STREET,
NEW YORK, N. Y.

Cent...
228 NO. LA...
CHICA...

Gloucester · Providence · Philadelphia · Baltimore · Ch...
Fort Worth · Houston · El Paso · Terminal Island · S...



The "F. Lutcher Brown," owned by the Higman Towing Co. of Port Arthur, Texas, is one of six sister ships, all powered by Atlas Diesels.

The "Dauntless," one of a fleet of five Atlas Diesel powered boats operated by Dauntless Towing Line, Inc., of New York.

ELS ARE THE FLEET ER'S CHOICE

observe "If a dog bites me once, I think
ame do er bites me again, I think 'Damn
y seem pervade the minds of owners of
fool wh uys the same lemon twice.

e purcha of a Diesel Engine, take your cue
owner o have bought Atlas Diesels con-
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able tha would make the same mistake
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Econom d Service, figure that they can't
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perienc those who have experimented.
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DIE ENGINE COMPANY

Cent sion — Western Division
228 NO. LA E STREET — 1000 NINETEENTH AVENUE
CHICA INOIS — OAKLAND, CALIFORNIA

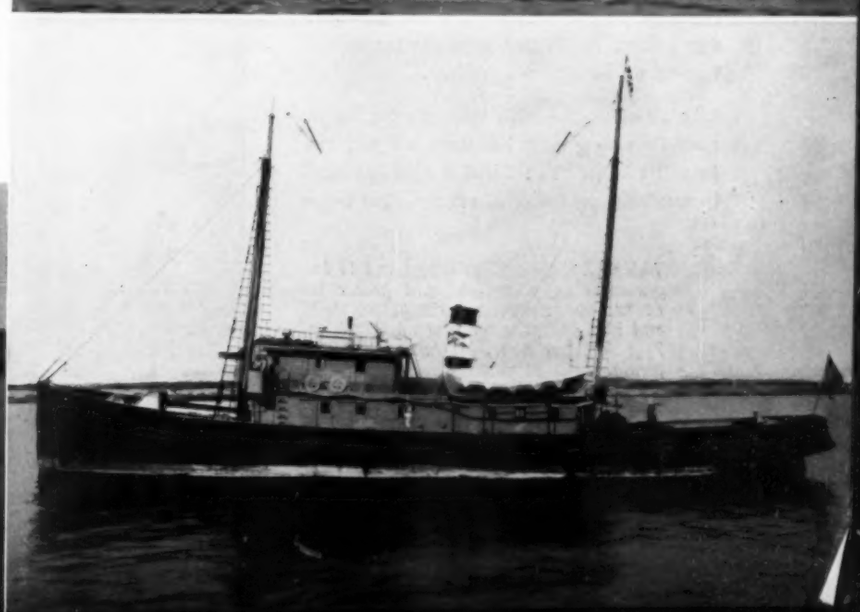
timore - Ch Miami - Jacksonville - Tarpon Springs - New Orleans
Island - S Portland - Vancouver - Ketchikan - Honolulu - Manila

Poling Brothers of New York have purchased sixteen Atlas Diesels for propulsion and cargo pump power for their fleet of oil tankers and barges. Right is "Poling Bros. No. 14."

The "George W." is one of thirteen vessels operated by the Shaver Transportation Co. of Portland, Oregon. Sixteen Atlas Diesels are used to power this fleet.

et of the six years Diesels.

The "Billy B. Lawton" is one of a fleet of eleven Atlas Diesel powered tow boats operated by W. T. Burton of Sulphur, Louisiana.



The "Chilkat," flagship of the fleet of eighteen Atlas Diesel powered cannery tenders operated by Alaska Packers Association of San Francisco.

Above — General view of the State Line Cafe at Wendover, Utah. At left — The two Caterpillar 60 bhp. Diesels and Westinghouse generators furnishing light and power for this cafe.

THE DIESEL EMANCIPATES THE HOT DOG

WILL H. FULLERTON

WHETHER he is a roadside vendor of the luscious "hot dog" or the hallowed "hamburger," or the operator of a swank lakeside watering place, or owner of the highway village dance pavilion — power is his problem.

It was his problem — for now the day of the Diesel-powered "dog" has dawned and owners of roadside spots have been quick to take advantage of it, as manufacturers of portable power plants of this type report.

The requirements of this power consumer have been carefully studied by the engine manufacturers and one, Caterpillar Tractor Co., has made some interesting installations as a result.

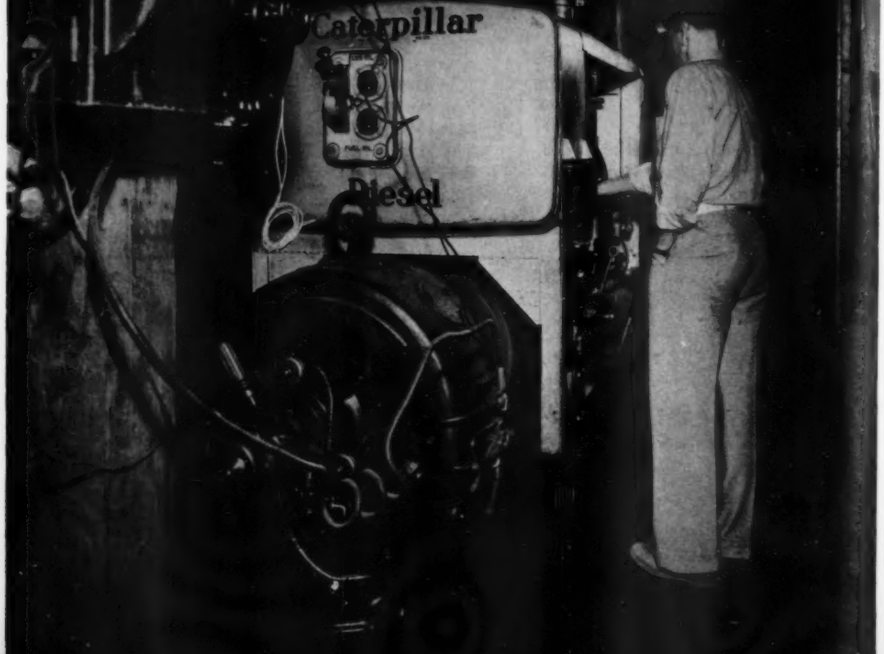
It was stated that power was the principal problem of the rural restauranteur. The need really splits up into manifold problems! Summer resorts, stands and pavilions are usually four to six months' propositions.

Like all of us, this man wants to pay for no more than he gets, and if there is a way out, he will take it. The Diesel engine has fitted in nicely for a number of reasons. For larger country establishments, it is excellent as auxiliary power. The Diesel is economical to operate and requires little or no adjustment.

A roadside inn is usually isolated, for the owner wants not only a spot which is handy for his tourist patrons, but it must be a site of some scenic beauty. This doesn't make for power economy when electricity is purchased off the line.

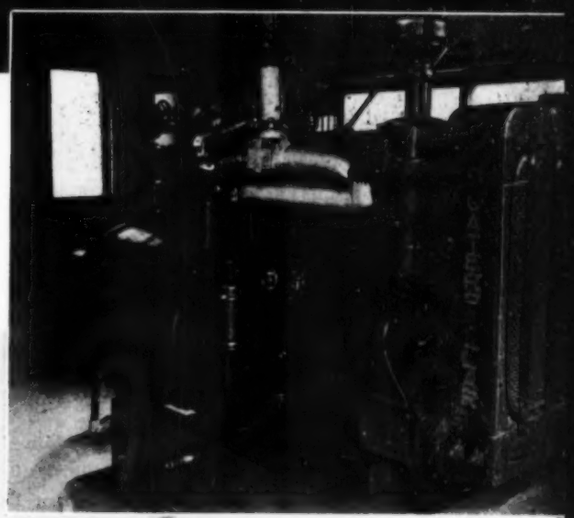
The Diesel electric generating set is compact, usually sold complete with radiator as a self-contained cooling system. Generator and engine are mounted on one base and are ideally suited for the tavern owner who has a place in the north for the summer and below the Mason-Dixon line in the winter.

The fire menace is something with which the proprietor has to contend. He feels safe with



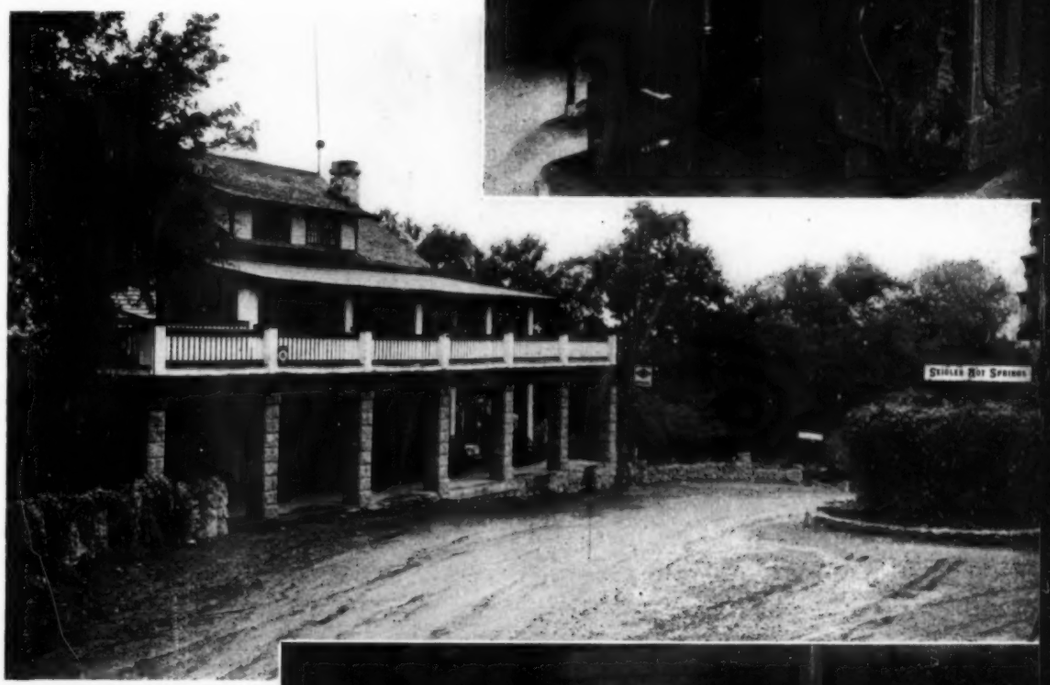
This 60 hp. Caterpillar Diesel and 15 kw. generator supplies light and power for L. W. Spengler's auto camp, fountain, and refrigerator, operating on 2 gals. of 7½c fuel per hour, at Cummings, California.

Above—General store at Riggins, Idaho, with its 44 hp. Diesel and 20 kw. General Electric generating set shown at right.



the Diesel, for with compression-ignition there is no elaborate system of wiring and spark plugs to consider. Again, there is no battery to charge or worry about; in fact, all parts are standardized, making for easy service and a minimum of adjustments. As a concluding reason, the proprietor has all the active and reserve power he needs for lighting, refrigeration, etc., and when he doesn't want it, he simply turns off the engine.

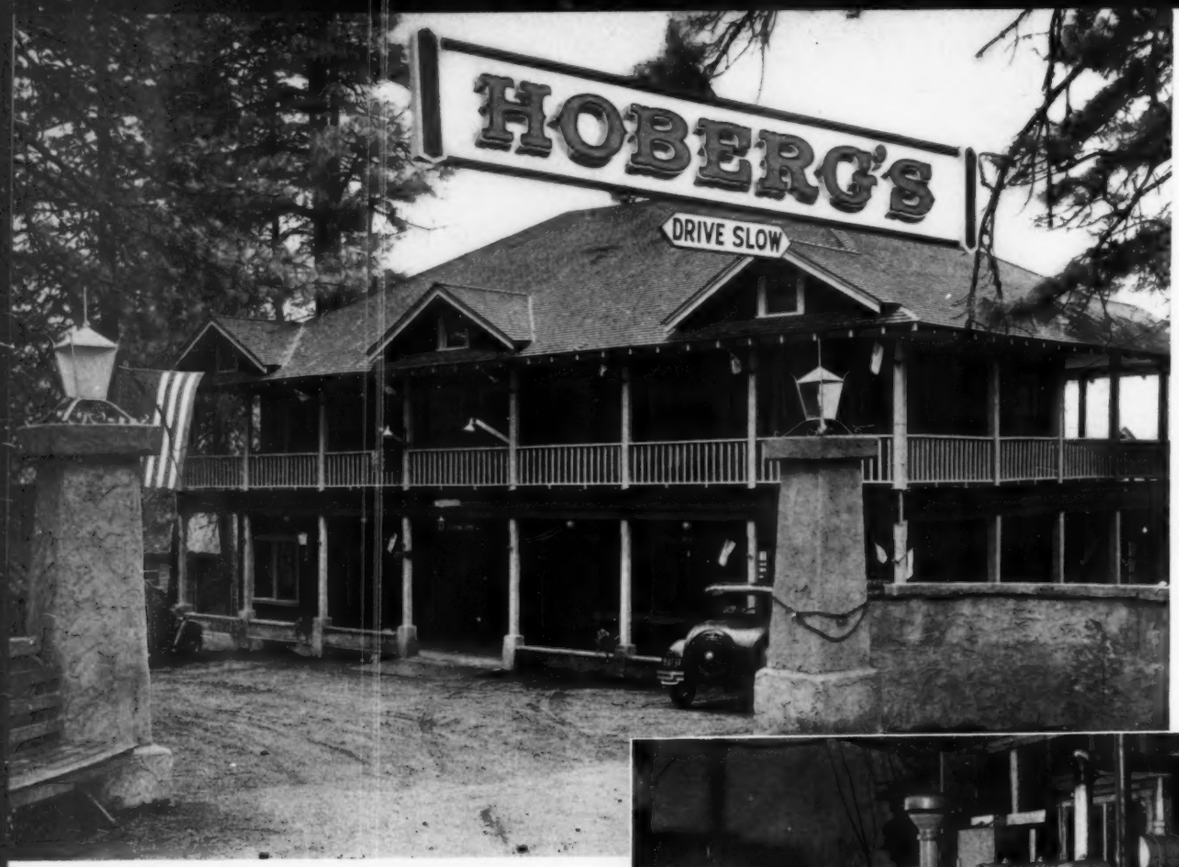
There is the State Line Cafe, garage and tourist cottage village, owned by W. F. Smith near Wendover, Utah, on the rim of the famous Bonneville racing salt beds where famous speed drivers bring their chargers to vie against the electric timer. Here Sir Malcolm Campbell kept his famous *Blue Bird* and subsequent racers. To take care of interior and street sign lighting, also several motors on the refrigerating system, together with cafe and garage appliances, Mr. Smith has installed two Caterpillar Diesel engines of 60 bhp. each. They are direct-connected to Westinghouse 31.3 kva., 240 volt generators. Installed in the fall of 1936, the owner has figured his operating cost on these two engines at less than 1c per kwh.



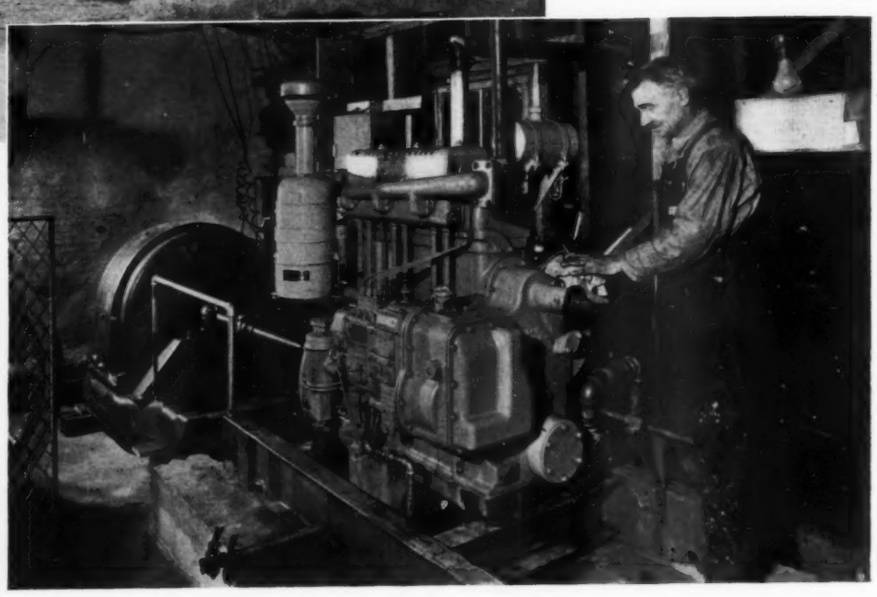
Take "The Shanty," for instance—located on a main highway near Memphis, Tennessee, a refreshment place owned by Julius Lewis: He found his power costs were running far too high. Then he purchased a 44 hp. Diesel electric generating set. The engine turns the Westinghouse generator at a fuel cost of 11.1c per hour. The average load is about 10 kw. The outfit is required to operate 20 hours a day.

Seigler Hot Springs at Seigler Springs, California, gets its light and power from the 44 hp. Caterpillar Diesel and the 25 kw. Westinghouse generator shown on the right.

John Bursell of Forrest Wood, Connecticut, had ideas about a trailer camp, outdoor dance floor, and a store out on route 179 between New Hartford and Hartland, so for light and



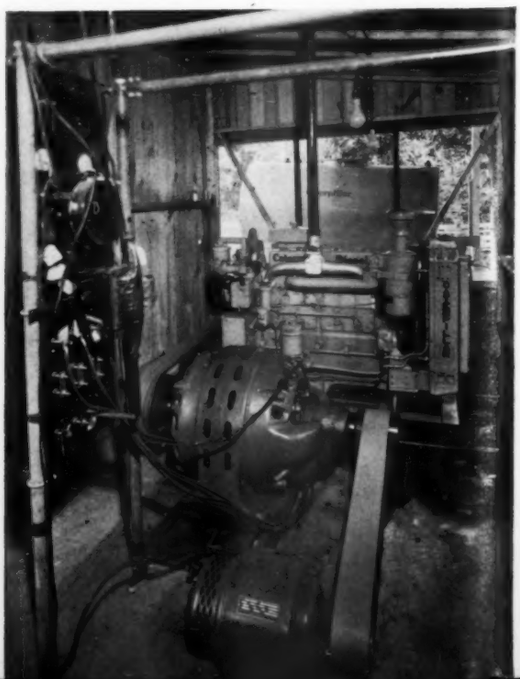
At Lake County, California, a 60 hp. Caterpillar Diesel, connected to a G.E. 35 kw. DC generator, furnishes light and power for Hoberg's resort. Engine room view is shown below.

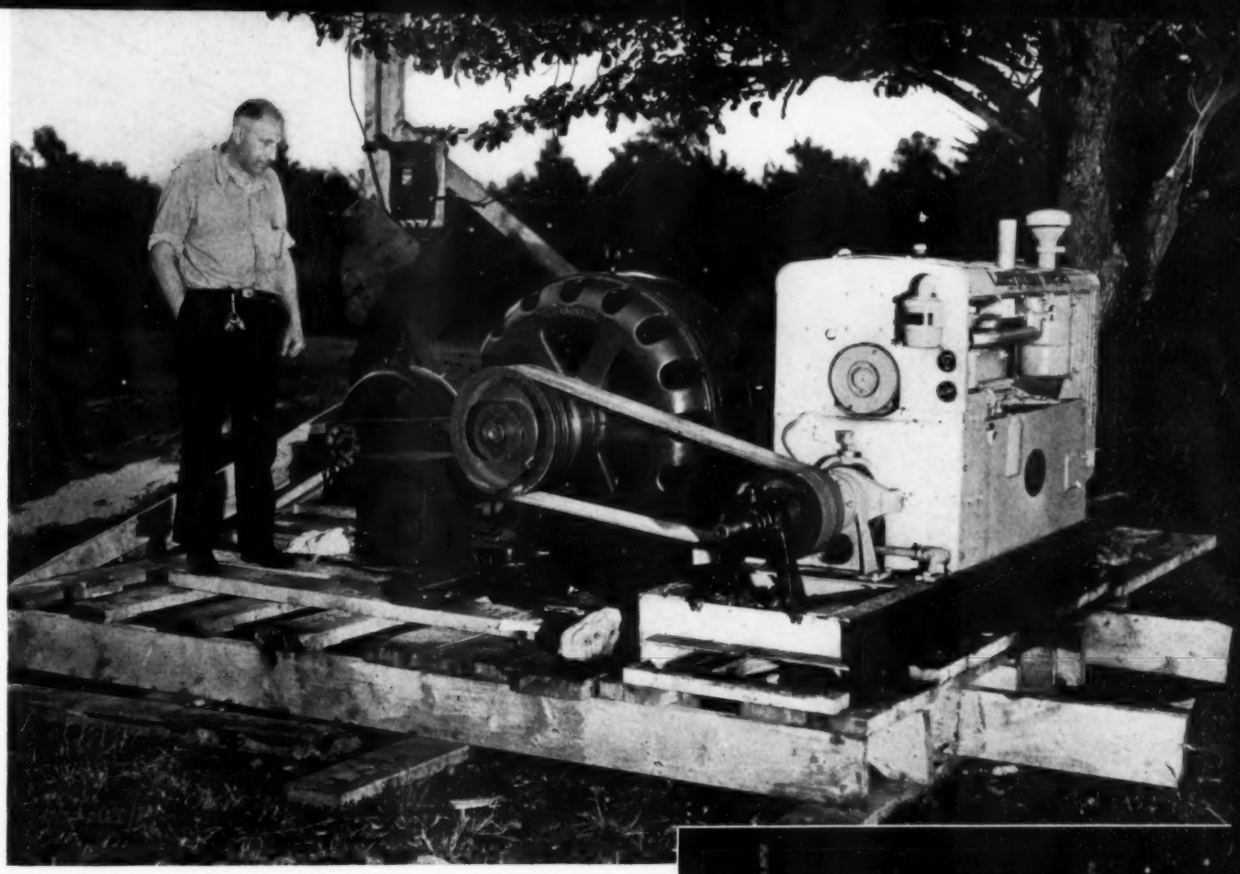


power he acquired a 44 hp. Caterpillar Diesel engine and Westinghouse generator driven by V-belt. His requirements are such that he needs to operate the engine only 6 hours a day. The average load is about 300 incandescent lights, and the engine handles this on only 1¼ gallons of 6½c fuel oil per hour. Similarly, Bob Berryman of Memphis, Tennessee, employs an 80 hp. V-belted generating set for his night club near that city.

At the Golden Rule Store, Riggins, Idaho, a 44 hp. Diesel-electric generating set supplies current for two stores and a gasoline station, working 24 hours a day on 20 gallons of 11c

Below—Roadside refreshment stand near Memphis, Tennessee, with its Caterpillar 44 hp. Diesel and Westinghouse generator shown at right.





At the right is shown the portable 44 hp. Caterpillar Diesel and Westinghouse generator supplying light for outdoor dance floor, illustrated below the engine picture, at Forrest Wood, Connecticut.

fuel. Riggins is 30 miles from the nearest branch line railroad, more than 100 miles from any main line, on the Salmon River, back of the Idaho mountains.

In Lake County, California, a 60 hp. Diesel engine and a General Electric 35 kw. DC generator supplies Hoberg's with light and power, working 24 hours a day during the busy season. The proprietor reports that his fuel and oil cost are about 70 per cent lower than with his former gasoline power.

A 44 hp. Diesel and Westinghouse 25 kw. DC generator have a big job at Seigler Hot Springs near a resort town of that name in California. The outfit furnishes light and power for 150 cabins, 36 hotel rooms, pumping for an indoor swimming pool, plus lighting in recreation hall and dining room. The engine runs day and night, 5 months of the year, on 35 gallons of 7c fuel per 24 hours' operation.

The tavern proprietor is a great visitor, and he is especially interested in what his competitor down the road is doing and how he does it. As a result, Diesel power has met with a rapid increase in popularity for this type of service, and bids fair to lead the field before many more summer seasons pass.

Below is shown Bob Berryman's night club near Memphis, Tennesseee, which is also lighted by power from a Caterpillar Diesel and generator set.

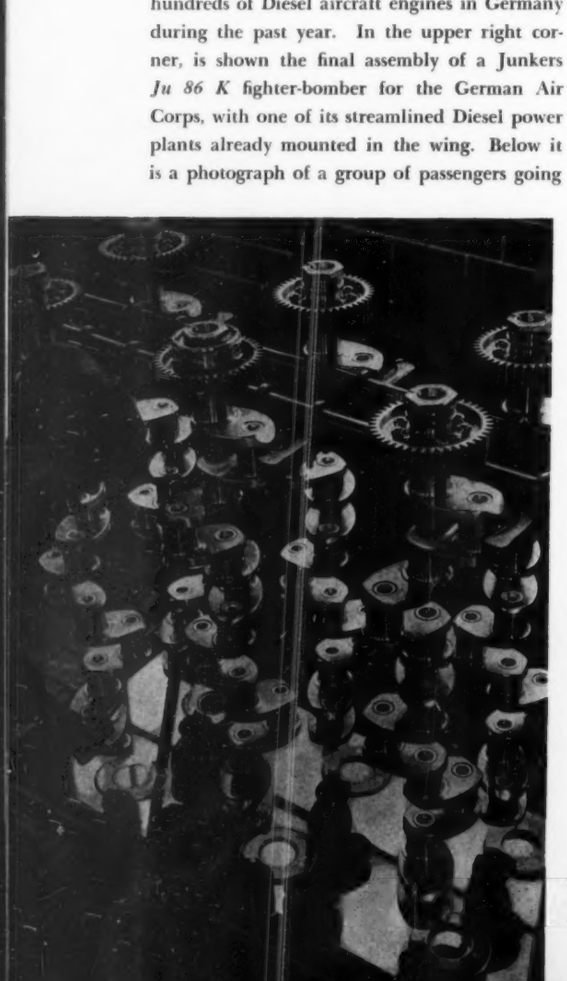
DIESEL AVIATION

The streamlined Dornier "Do 26" flying boat can carry a 2,500 lb. payload non-stop between New York and Lisbon.

PROGRESS IN DIESEL AVIATION IN 1938

By PAUL H. WILKINSON

A GENERAL idea of the progress made in Diesel aviation in 1938, can be obtained from the illustrations on these two pages. In the lower left corner is seen a batch of finished crankshafts for Junkers *Jumo 205* Diesels, representative of the parts that have gone into hundreds of Diesel aircraft engines in Germany during the past year. In the upper right corner, is shown the final assembly of a Junkers *Ju 86 K* fighter-bomber for the German Air Corps, with one of its streamlined Diesel power plants already mounted in the wing. Below it is a photograph of a group of passengers going on board one of Deutsche Lufthansa's Diesel-engined, ten-passenger airliners at Hamburg for a *short scheduled flight* of 163 miles to Berlin.



A batch of crankshafts for Junkers "Jumo 205" Diesels.

At the head of the article is seen one of the new streamlined Dornier *Do 26* flying boats, a number of which will be used this year by Deutsche Lufthansa for service over the North Atlantic and South Atlantic. The *Seeadler* shown in the photograph, is powered with four Junkers *Jumo 205* Diesels. It can fly *non-stop* between Lisbon and New York with a 2,500 lb. payload at a cruising speed of over 190 mph., taking off from the water with full load.

Readers of DIESEL PROGRESS, of course, are well posted on these facts as they have been given the latest information obtainable on the subject direct from the countries concerned – and not through Washington channels. These pages should be news, however, to the heads of the Army Air Corps and the Bureau of Aeronautics and their associates, who have been so negligent in providing the United States with an adequate Diesel aircraft industry. Whether they will profit from them, is doubtful, judging from the ignorance shown by such gentlemen on the subject at the recent S.A.E. meeting at Detroit. From the factitious remarks and evasive replies emanating from Major General H. H. Andrews, Chief of the United States Air Corps, and Capt. John H. Towers, Assistant Chief of the Bureau of Aeronautics for the Navy at this meeting on January 11, one would gather that the engineers in this country are incapable of equalling the achievements of engineers in other countries when it comes to building Diesel aircraft engines. These insults to the capabilities of Americans who could well build such engines if they were given the opportunity and the financial assistance to do so, are typical of the non-progressive attitude of the so-called experts who are weakening our National Defense.

The government is not the only party who is to blame for this state of affairs. No particular effort has been made by our air transport companies to secure Diesels for their passenger planes apart from the assurance that the engines will be welcome when they are produced. The company officials and the stockholders apparently are content to operate "in the red" and at the same time expose their passengers and their equipment to unnecessary fire hazard on the ground and in the air.

The money which these companies have lost through fire alone, would have more than paid for the development of Diesels using non-explosive fuel. It would have been money well spent, insuring the lives of their passengers and personnel, and safeguarding their costly

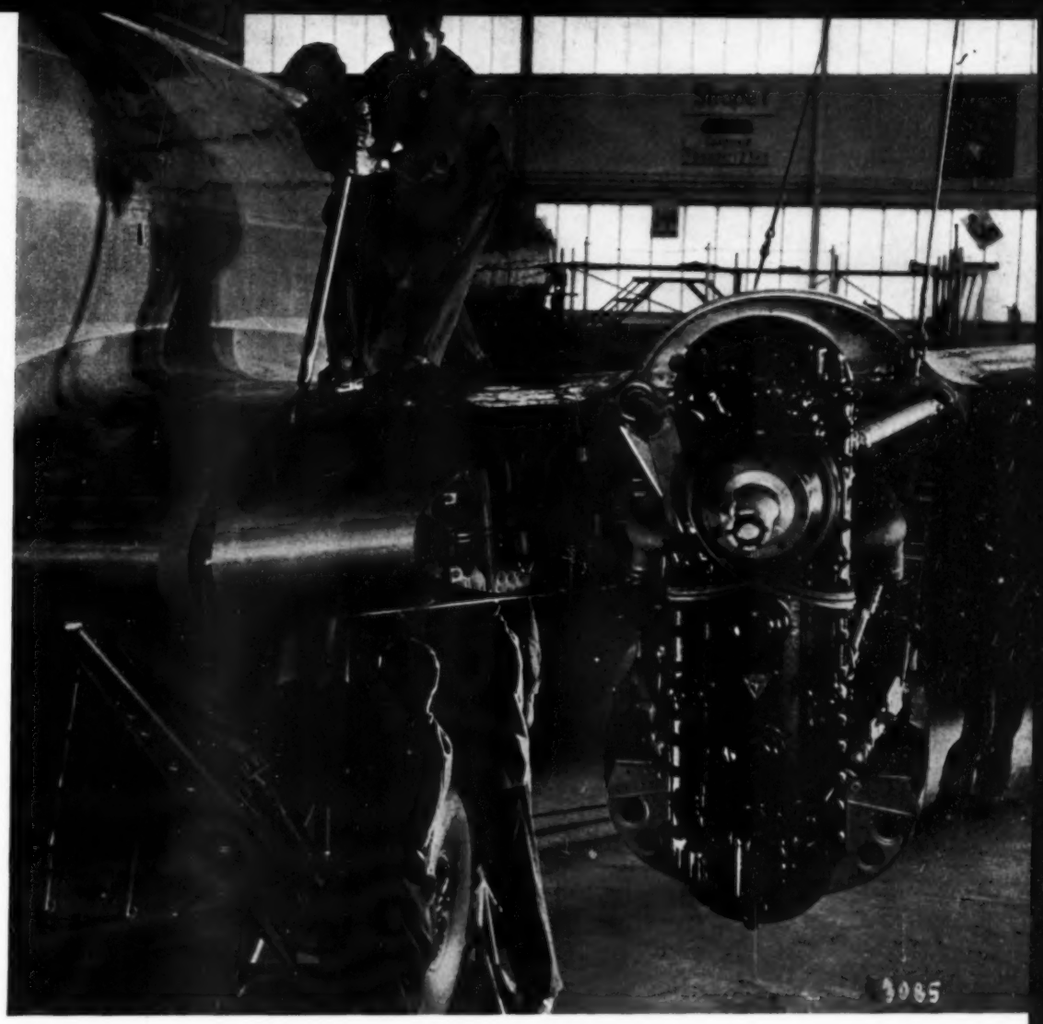
equipment against fire. It would have been a far better investment than the millions of dollars poured into a huge four-engined landplane for which there will be little use on their airlines until it is powered with Diesels.

With regard to the progress made in Diesel aviation in 1938, the rumor was circulated from Washington and elsewhere that development and production of the Diesel had been abandoned in Germany in favor of the gasoline engine. Nothing could be further from the truth, as will be shown in due course. The fact of the matter was that the rearmament program took all the Diesels that could be produced, and new models of the engine were placed on the restricted list.

During 1938, Deutsche Lufthansa did not increase the number of Diesel engines which they had in service, and yet there was an appreciable gain in the mileage flown. With only fifty engines in active service, they flew a total of 1,247,428 miles with Diesel-engined aircraft. This brings the grand total to 4,243,895 miles for scheduled commercial flights with the Diesel.

The latest plane to be added to Deutsche Lufthansa's fleet was the Dornier *Do 26* flying boat which completed more than 26,000 miles of test flights during the latter part of the year. A number of these new planes will be commissioned this year, and 1940 should see the advent of huge new passenger airliners with far more powerful Diesels than those on which data has been released.

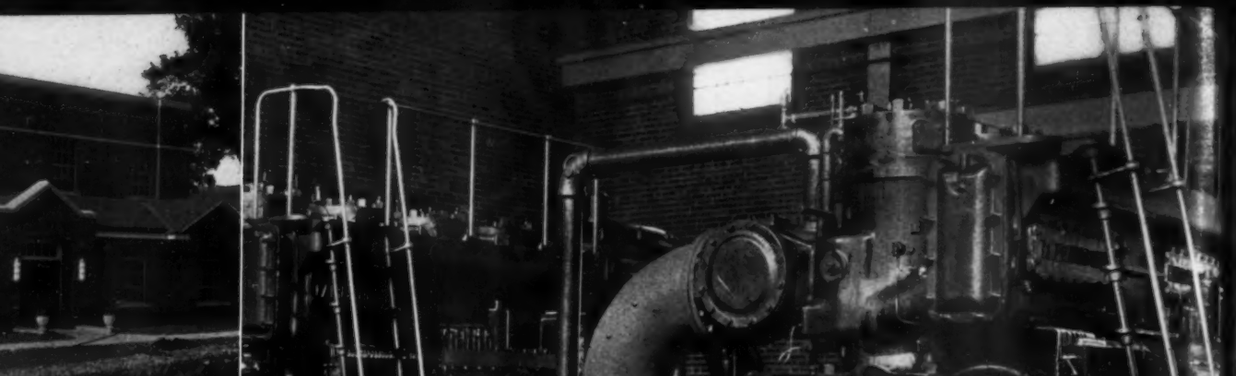
The only new Diesel released for commercial use from the Junkers factory was the *Jumo 205-E* which has a power rating of 700 hp. at 2,400 rpm. and a specific weight of 1.70 lb. per hp. Apart from these factors, it is identical to the *Jumo 205-C* in every respect.



Assembling a Junkers "Ju 86 K" twin-engined fighter bomber.

In the next issue of DIESEL PROGRESS, the new 2,000 hp. *Clerget 16-H* Diesel which was exhibited at the Paris Aero Show, will be illustrated and described. It is equipped with an exhaust-driven supercharger.

One of Deutsche Lufthansa's Diesel-engined airliners at Hamburg.



Front view of plant at Trenton, Missouri, above. At right—Partial view of engine room showing two of the three Fairbanks-Morse marine type 650 hp. Diesel engines and generators.

TRENTON, MISSOURI

By GLENN C. BOYER*

TRENTON, Missouri, wanted lower electric light rates. It tried conferences with the private utility operating in the community, and finally went to the Public Service Commission to get reduced rates. After all the smoke had cleared away, Trenton still didn't have what it wanted. Local sentiment favored a municipal plant since conferences and commission hearings did not lower electrical energy costs sufficiently. Trenton got its plant.

The municipal generating plant and distribution system went into operation on November 1, 1937, and now that a full year's record is available, let's look at what the present-day Diesel power plant can do in the way of operation. During this year a total of 2,678,400 kilowatt hours were generated, using 211,744 gallons of fuel oil or an average energy production of 12.7 kilowatt hours per gallon of fuel. Lubricating oil consumption, after adjustments made during the first month of operation, showed 2,100 rated engine horsepower hours per gallon. This figure still does not satisfy the operating staff and they are working now to reduce the lubricating oil consumption. Energy used for station auxiliaries and lights was 6.2 per cent of the total energy generated.

What kind of a plant is it? There are installed three 650-horsepower Diesel engines, each connected to a 447 kilowatt generating unit. The engines and generators were constructed by Fairbanks, Morse & Company, and the engines are the marine type Model 33-D-16, 4 cylinder, 2 cycle, running at 277 rpm. Pump scavenging is utilized and all pistons are oil cooled. Each engine is equipped with a Woodward governor for close speed control, and Alnor pyrometers for check on combustion conditions.

General view of engine room showing exhaust side of engines. Note traveling crane way over head.

*Associate Engineer, Burns & McDonnell Engineering Company.

The power plant building is a reinforced concrete, brick and steel structure 40 feet by 70 feet, with a full basement. It is connected directly to the waterworks plant. Space is provided in the present building for a fourth generating unit of the same size as those now installed.

All mechanical and electrical equipment is housed in the building and ample provisions have been made for additions wherever necessary without undue crowding. All starting air equipment, fuel and lubricating oil conditioning equipment, circulating water pumps, and station service transformers are located in the basement. The main operating floor contains the generating units, switchboard and switching equipment, office, and washroom.

Engine jacket cooling water is provided by a spray type cooling tower which is equipped with a bypass for cold weather operation. Due to lack of funds at the time the plant was constructed, a single-circuit cooling system was installed. Water treatment has been necessary, and to date very satisfactory operation has been maintained. Treatment of cooling water was by means of zeolite, although a threshold treatment of "Calgon" has been found to be very effective with the water encountered in this particular installation.

Temperature differentials of from 6° to 8° F. have been maintained constantly across the engines. Due to the fact that the tower was installed on a side hill with numerous trees close to the tower, it has been found necessary to cover the entire tower, both top and sides, with a coarse wire netting to keep leaves out of the tower basin. An emergency connection to the city's water supply is provided and water is assured at all times by means of an elevated storage tank located adjacent to the plant.

Lubricating oil is conditioned with a Goulds Hydroil purifier Model 335, Type SHVA. There is a Schutte- Koerting twin strainer on piston cooling circulating oil line. Each engine. unit is provided with a divided lubricating oil tank so piped up that either batch or continuous centrifuging of lubricating oil can be accomplished. A second Goulds Hydroil, Model 320, Type SRVA, is installed for centrifuging fuel oil. Each engine is provided with a day fuel oil tank of rectangular design located adjacent to the engine's foundation in the basement. Fuel oil is filtered through a Nugent filter.

The main fuel oil storage consists of two circular concrete tanks, located below ground and provided with coils for cold weather operation.

Goulds Hydroil units for fuel and lubricating oil cleaning with lubricating oil tanks in foreground.

Each tank has a capacity of 25,000 gallons of fuel oil. It was originally planned to pump oil from the railroad to the plant site. but the cost of the necessary pumping facilities and pipe line was considered too great for the initial installation, and oil is handled in trucks to the plant site at the present time.

Three circulating water pumps are available. These units, pumping into a common circulating water header for the three engines are each rated 240 gpm. at 45 feet total head. Water lines are equipped with Jenkins valves.

Since the power plant building is situated in a valley, it was possible to locate the cooling tower and fuel oil storage tanks on high ground and provide a positive head over fuel oil and circulating water pumps at all time.

Both motor and gasoline-engine driven air compressors are installed in the plant, together with two air starting tanks, each of which has sufficient air capacity to provide for a minimum of ten starts of any engine. A common high pressure air system connects all three engines to the starting tanks.

A 5-ton Shaw-Box, Type BR traveling crane was provided in the engine room to facilitate erection and maintenance of equipment. Since this crane would only be used intermittently, a complete manually operated unit was provided.

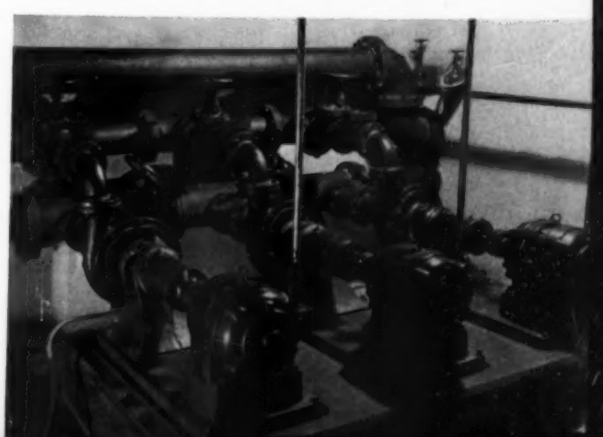
From a design standpoint, the most outstanding feature of this station is the heating system utilizing heat from the exhaust. An extensive analysis of heating systems employing air circulated around the Minimax exhaust silencers indicated that the trouble with most systems of this type was the failure to circulate sufficient air around the silencer to absorb the heat required. In an effort to remedy this situation, a radical departure from most heating systems of this character was made.

The system developed consists of a single motor driven blower and connecting duct work from the blower to all silencers. Damper installed in the duct system permit the air to be directed to a single silencer, or to be divided between the active silencers in such a manner as to provide the most effective heat distribution in the building. In this particular case, a fan having a capacity of 4,500 cubic feet of air per minute against a static pressure of one inch of water was installed. The duct system was designed in accordance with modern hot air heating practice, and all parts of the system were proportioned to maintain constant air velocities from the fan to the outlets into the engine room. The fan and duct work were located in the basement, and the discharge grilles in the engine room were so arranged to provide a positive circulation throughout the building.

Tests of the heating system prove that the design was correct, and the plant has always had sufficient heat during severe weather conditions.

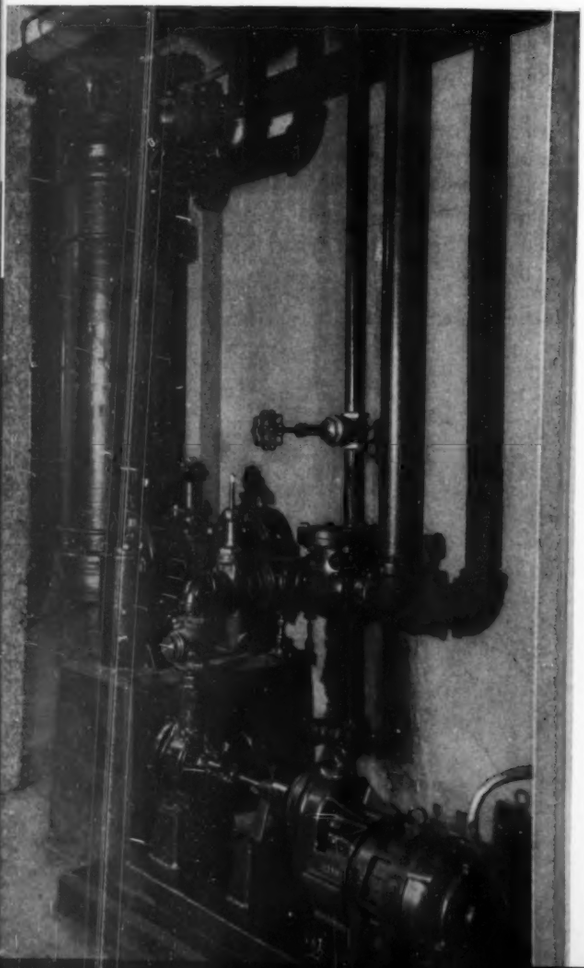
Small electric heaters were installed in the office and washroom, since the cost of provid-

Battery of three direct-connected motor-driven circulating water pumps in the basement.



Above — General view showing the control panel, switchboard and switch gear at the Trenton, Missouri, Municipal generating plant.

The Schutte & Koerting lubricating oil cooler, twin strainer, and transfer pump installation are shown below.



ing the necessary heating ducts for the hot air system was felt to be excessive for the heating requirements in these two rooms.

In order to provide for electrical switching equipment, the space for the main switchboard and auxiliaries is 11 feet by 28 feet. All high voltage equipment is installed remote from the switchboard, and oil circuit breakers are operated by means of manual link and lever systems. A transfer bus is provided with selector switches so that any circuit breaker may be taken out of service and maintenance work done on it in safety.

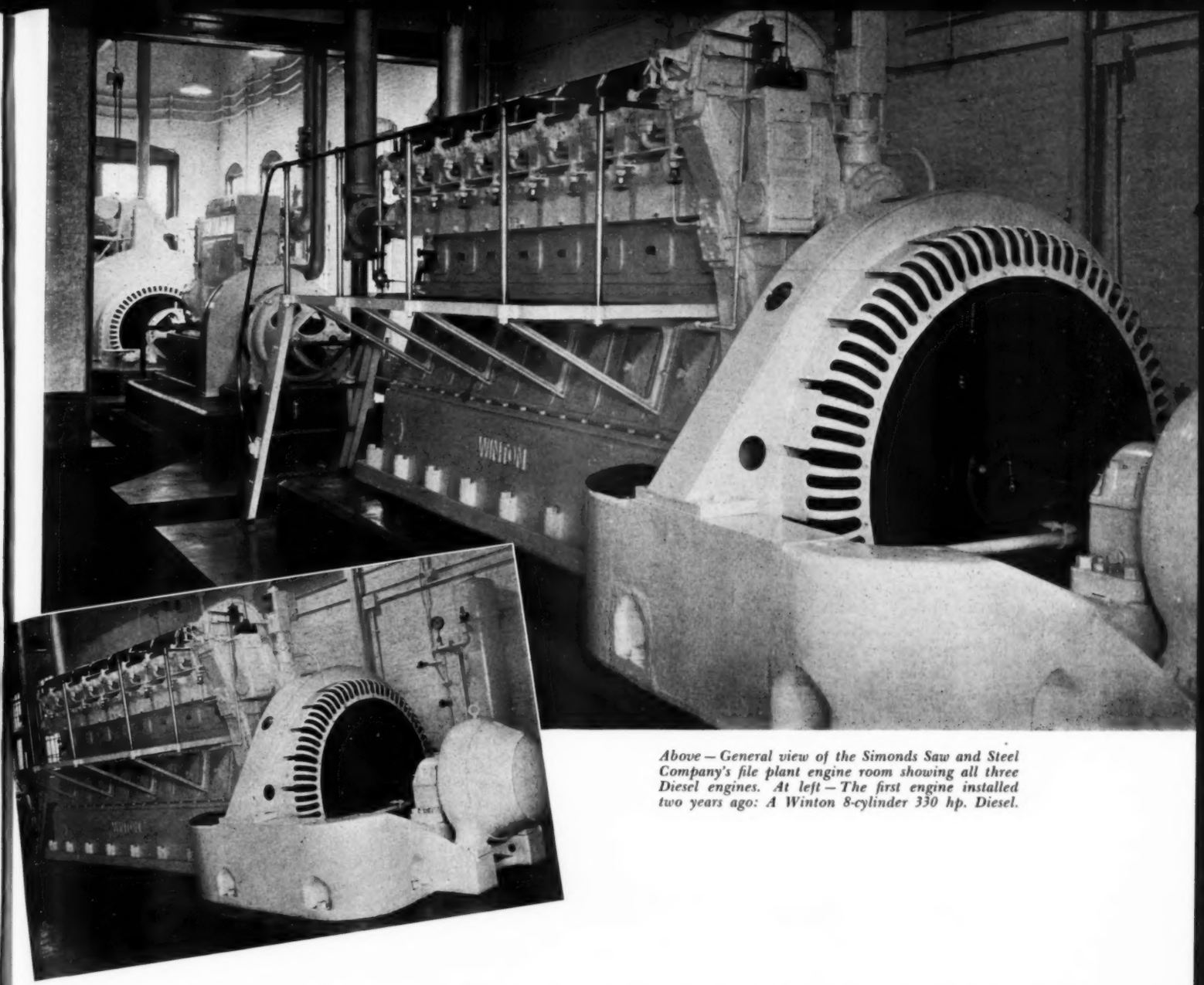
The present switchboard is designed for three generators, a separate voltage regulator for each generator, a totalizing panel, and four outgoing feeder circuits. One of these four circuits furnishes the power for waterworks pumping and station auxiliaries only. All circuits leave the plant underground and extend to terminal poles some distance from the plant.

While the plant went into operation on November 1, 1937, it was not until November 8 that final acceptance tests were started on the engines. Two days were required for the tests, which were conducted at full, three-quarters, and one-half loads on each engine. The following tabulation is a summary of these tests:

GUARANTEED AND ACTUAL FUEL OIL CONSUMPTION

GUARANTEES			
Generator output kilowatts	447	335.25	223.5
Per cent rated load	100	75	50
Fuel, Lbs. per kwh.	0.56	0.58	0.63
FINAL TEST RUNS			
Unit No. 1			
Generator output kilowatts	450	338.2	218.1
Fuel, Lbs. per kwh.	0.50	0.518	0.635
Test better than guarantee by	10.8%	10.8%	1.0%
Unit No. 2			
Generator output kilowatts	429.4	321.3	225.8
Fuel, Lbs. per kwh.	0.495	0.565	0.638
Test better than guarantee by	11.5%	3.5%	—1.5%
Unit No. 3			
Generator output kilowatts	439	320.2	212
Fuel, Lbs. per kwh.	0.504	0.583	0.59
Test better than guarantee by	10.2%	—0.5%	7.9%

All engineering work, including the design and final tests of the plant, was done by Burns & McDonnell Engineering Company. The total cost of the plant was $162,593, of which $119,900 represents the cost of equipment and $42,693 covers the cost of the power plant building.



Above — General view of the Simonds Saw and Steel Company's file plant engine room showing all three Diesel engines. At left — The first engine installed two years ago: A Winton 8-cylinder 330 hp. Diesel.

FITCHBURG, MASSACHUSETTS, FACTORY MODERNIZES WITH DIESELS

By WILBUR W. YOUNG

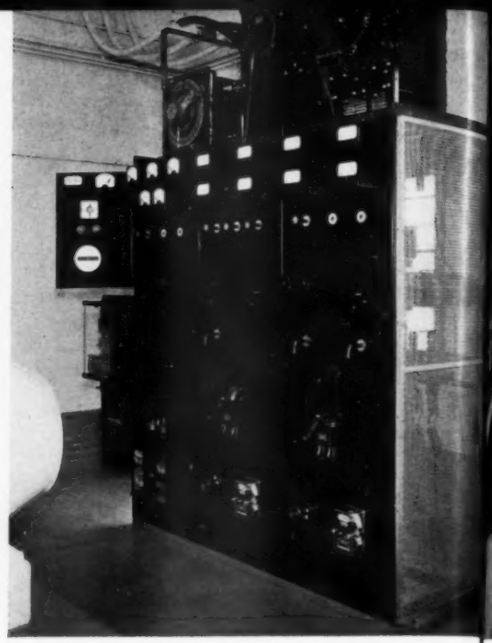
ONE of the most interesting Diesel installations in the New England territory is that in the Simonds Saw and Steel Company's file plant at Fitchburg, Mass. This consists of three engines: A Winton, a McIntosh & Seymour engine, and a Superior. As part of a far reaching modernization program, this Diesel installation was started two years ago and is performing up to all expectations.

A quarter of a mile across the fields from this file plant, a new modern wonder in factory design and construction is nearing completion. Here is a one-story, windowless building enclosing five acres of floor space which is destined to house the plant under description as well as two other divisions of the parent company. The lighting load for this new building is estimated at 500 kw. Four air-conditioning units, requiring a total of 220 hp. for air propulsion, will condition outside air to the temperature and humidity of a spring morning. Wiring from the present Diesel power plant to the new building is already in place.

The number and size of Diesel units installed provide for ready adjustment of the prime movers to unusually varying load conditions in this plant. The watt meter shows surges up to 250 kw. within intervals of seconds. The generators must not lag under these surges because many processes in the plant require uniform electrical frequency.

The original Diesel installed two years ago was paralleled with the power company's high line which acted as a stabilizer for the extremely

View of the engine room roof showing the three Maxim exhaust silencers and the three Staynew intake air filters and silencers.



The control panel and switch gear.

fluctuating loads. This was a Winton engine, 330 hp., 8-cylinder, 4-cycle, 10 in. bore by 14 in. stroke, solid injection type, direct-connected to a General Electric 240 volt, 682 amp., 225 kw. alternator with a General Electric direct-connected outboard exciter. This arrangement proved so satisfactory that the company decided to supply the entire power requirements of the file plant from a Diesel power plant without outside connection. Close regulation of frequency was still paramount since several grinding machines in the plant are dependent for proper operation on a minimum of electrical frequency variation.

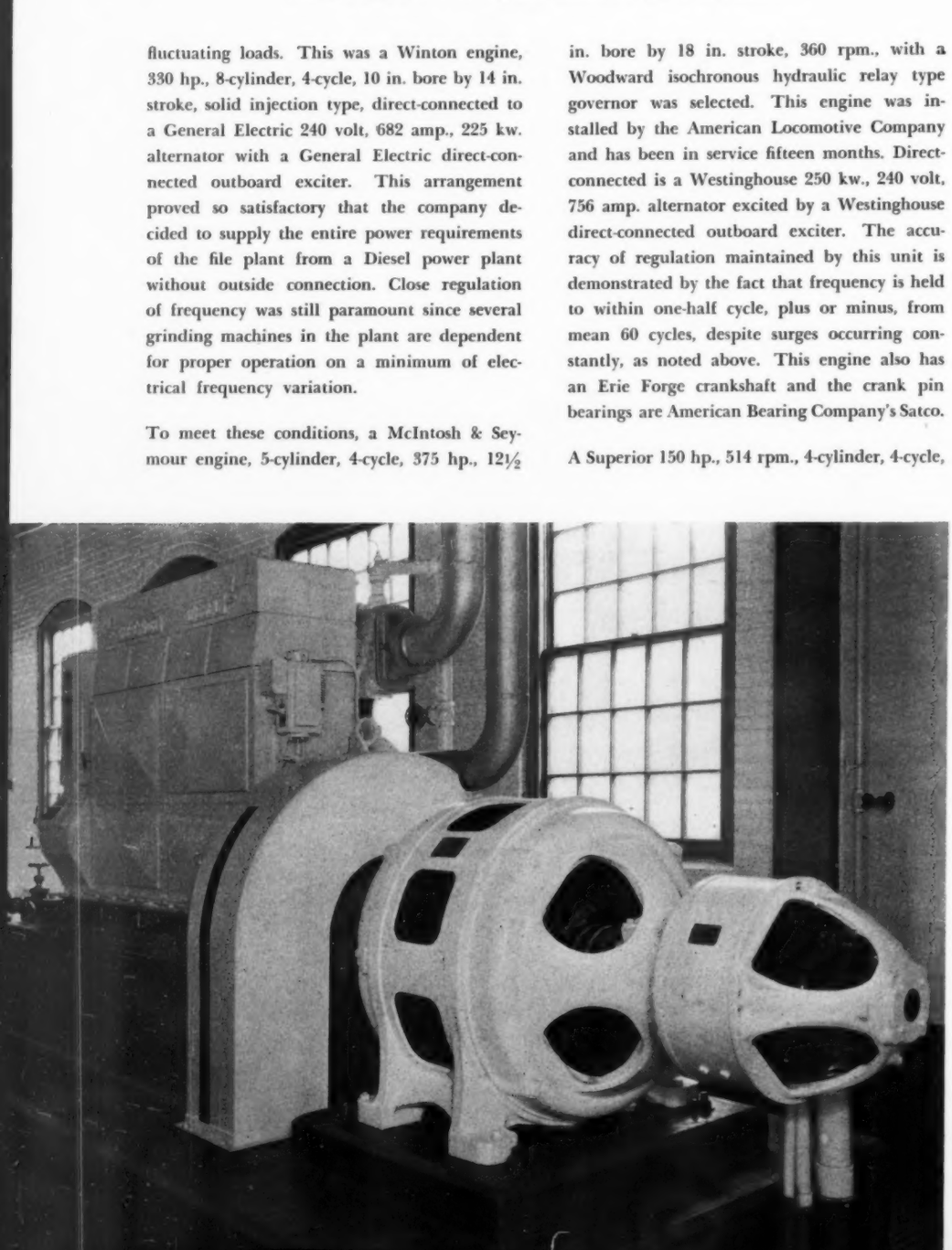
To meet these conditions, a McIntosh & Seymour engine, 5-cylinder, 4-cycle, 375 hp., 12½ in. bore by 18 in. stroke, 360 rpm., with a Woodward isochronous hydraulic relay type governor was selected. This engine was installed by the American Locomotive Company and has been in service fifteen months. Direct-connected is a Westinghouse 250 kw., 240 volt, 756 amp. alternator excited by a Westinghouse direct-connected outboard exciter. The accuracy of regulation maintained by this unit is demonstrated by the fact that frequency is held to within one-half cycle, plus or minus, from mean 60 cycles, despite surges occurring constantly, as noted above. This engine also has an Erie Forge crankshaft and the crank pin bearings are American Bearing Company's Satco.

A Superior 150 hp., 514 rpm., 4-cylinder, 4-cycle, 514 rpm., 9 in. bore by 12 in. stroke, solid injection engine stands by for peak loads and other emergencies. A Westinghouse alternator rated at 100 kw., 240 volts, 300 amps. with a direct-connected Westinghouse outboard exciter is driven by this engine. The total installed power in this plant is therefore 575 kw. at 240 volts. It is interesting to note that all of these engines are bolted directly to solid concrete foundations resting on hard pan and there is no noticeable vibration.

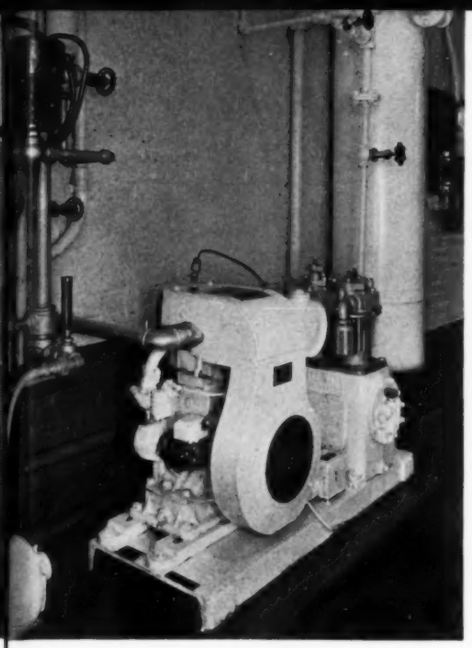
The Diesel plant is a model of cleanliness. The engines, generators, accessories, and piping are painted in white Sapolin radiator and range heat resisting paint which is kept spotless by frequent wiping and occasional washing. Battleship gray floors and foundation slabs present a striking contrast in the color scheme.

One of the interesting features of this installation is the closed system of jacket water cooling with an evaporative type cooling unit, first installed for the Winton engine a year ago. This is a Buffalo Forge Company size No. 1538 unit rated to dissipate 1,200,000 Btu. per hr. based on water from the engine at 135°F. on days when the wet bulb temperature is 78°F.

The cooling unit, occupying floor space of 2'6" x 7'6", consists of a heavy galvanized casing in which is mounted a set of extended copper finned coils through which soft water from the engine jacket is pumped, a set of non-clogging centrifugal spray nozzles mounted above the



The Superior 4-cylinder 150 hp. Diesel with Westinghouse 100 kw. alternator and exciter.



Quincy compressor and air storage bottle for engine starting air. Note Ross heater and Powers regulator in upper left-hand corner.

coils, a set of eliminator plates, and a fan section with three double width centrifugal fans mounted on one shaft V-belted to a 2 hp. motor.

The soft water side handles 85 gals. per minute pumped from the coil outlet to the water inlet on the engine jacket, then through the engine back to the inlet connection on the coil. Little regulation of the by-pass around the coil is required because as the temperature of the water from the engine jacket goes down the cooling effect of the evaporative unit drops rapidly which gives almost automatic temperature regulation.

Cooling water floods the finned coils continuously and cooling is accomplished by the evaporation of moisture from the wetted surfaces. About 1 gal. per minute is evaporated for each 500,000 Btu. of heat dissipated. The balance of the spray water returns to the concrete storage tank completing the cycle. The cooler for the Superior and McIntosh & Seymour engines is identical to the above cooler except for size and for the fact that the coil circuits are divided so that part of the coils are connected to one engine and part to the other. This unit is a Buffalo Forge No. 1838 and is rated at 1,700,000 Btu. per hr. It remains to be said that jacket water makeup is taken from the city main without softening treatment.

Common to the three engines are Woodward governors, three Maxim DO-4 silencers, three Staynew type DS intake air filters and silencers, Frahm system frequency meter, supplied by James G. Biddle Company, Mercoid switches to lights and horn for jacket water temperature alarm, Pennsylvania motor-driven rotary jacket water pumps, Roots turbine self priming cooling water pumps, and Empire fuel meter. Fuel oil for all engines is Colonial Beacon, 28-32 Baumé.

Fuel injection on the Winton engine is the common rail type, using a Purolator filter and a Roper rotary transfer pump. This engine is lubricated with Texas Ursa heavy medium lube oil using a Goulds Hydroil for purification with a Ross Heater for lube oil cooling and a Powers regulator. The Winton is further equipped with a Fulton Sylphon lube oil temperature stop and alarm, Motoco jacket water and oil thermometer, and Alnor exhaust pyrometers.

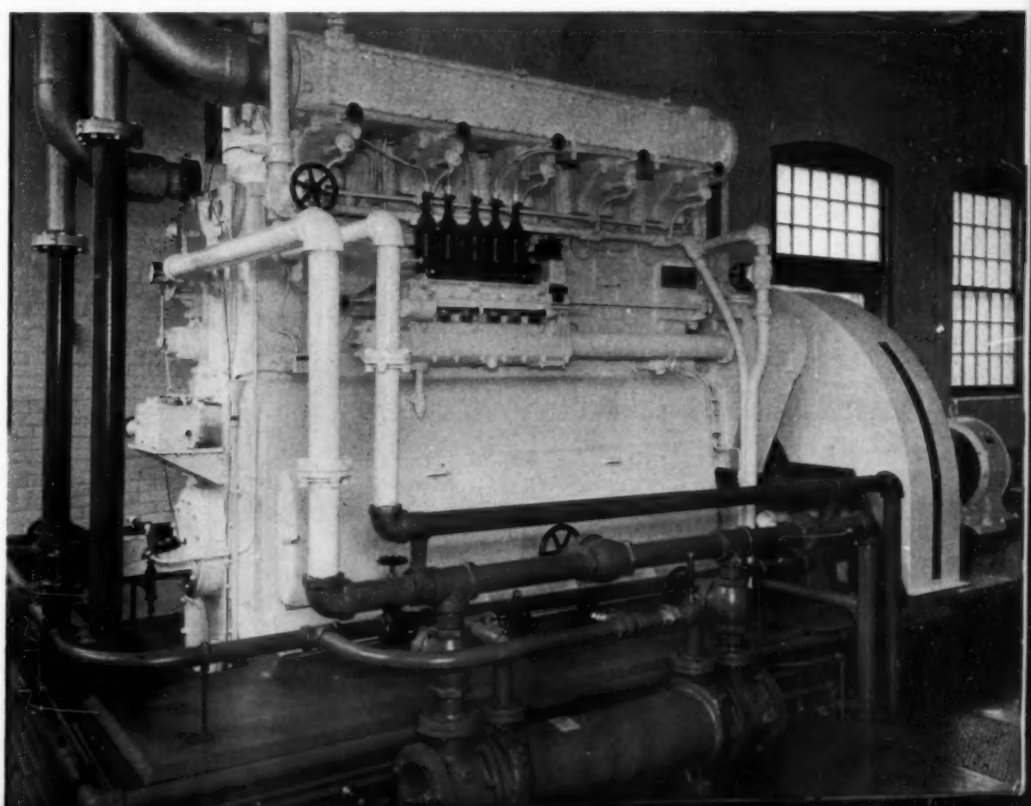
The McIntosh & Seymour engine is lubricated with Texas Ursa, using a Schutte-Koerting lube oil cooler and strainer. The lubrication system is protected by a U. S. Gauge solenoid-operated alarm and stop. All water temperature thermometers are U. S. Gauge. Lube oil from this engine is reclaimed in the same manner as the oil from the Winton. This engine is also equipped with a Bosch fuel injection pump, Brown exhaust pyrometer, Reliance tachometer, and a Manzel lubricator.

Lubricating oil for the Superior engine is Shell Talpa which is reclaimed in a type "C" Hilco continuous oil reclaimer handling 175 gals. in 24 hours. Lube oil cooling is done in a Schutte-Koerting cooler and the lubricating system is protected by a Pennsylvania alarm and stop. The exhaust pyrometer is an Alnor, tachometer is Reliance and the air and lube oil pressure gauges are U. S. Gauge.

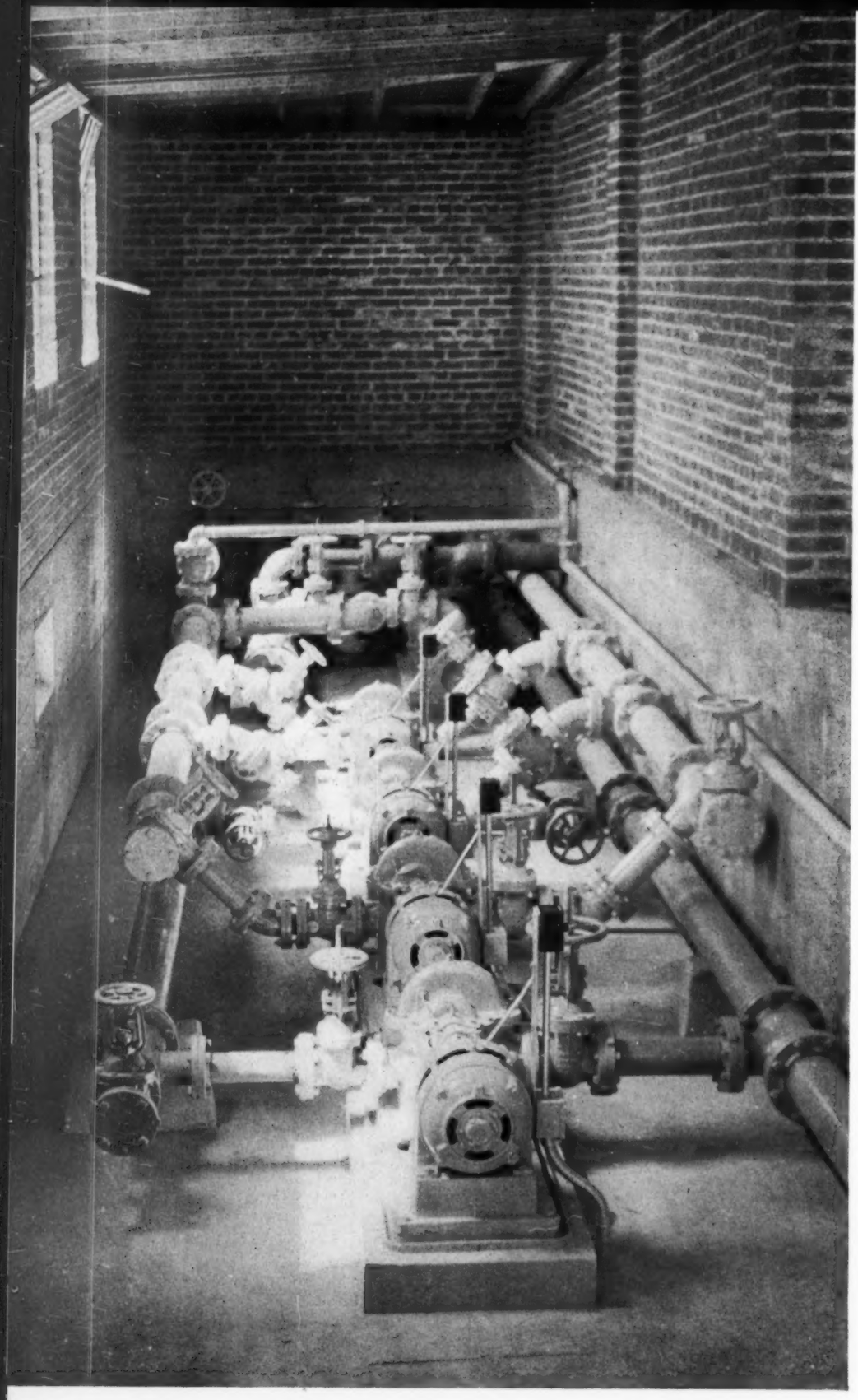
Architect's drawing showing the new five-acre, windowless Simonds Saw and Steel plant.

A bank of 60 Exide Ironclad batteries carries the lighting and small motor loads over the week ends and at all times when the factory is shut down. These batteries are kept up by one trickle and two Tungar chargers with a G. E. motor generator set standing by for rapid charging. Switch gear and control panel and instruments other than those mentioned were supplied by both G. E. and Westinghouse.

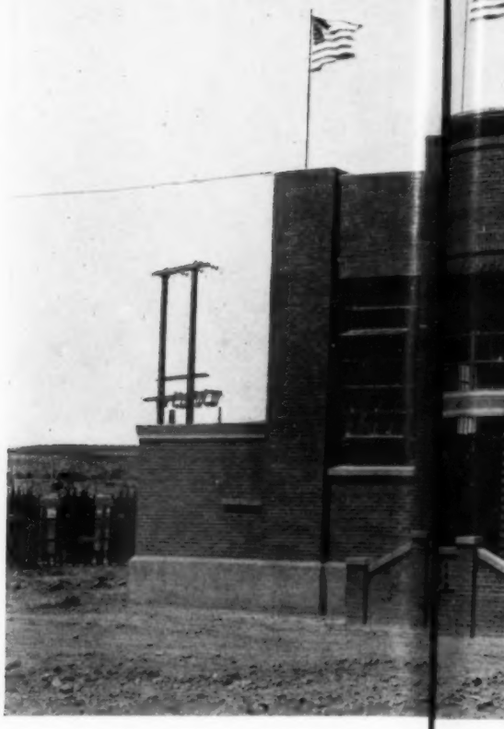
It may be said that this Diesel electric generating plant has given a good account of itself in that the average overall output is 12 kw. per gal. of fuel and that the equipment is delivering current of satisfactory characteristics under exacting requirements and severe load conditions. It is fitting that this modern Diesel plant should be ready to pick up its share of the load in the ultra-modern factory now nearing completion.



The McIntosh & Seymour 5-cylinder 375 hp. Diesel. Note Bosch fuel injection pumps and Manzel lubricator on engine and Schutte-Koerting lube oil cooler.



View showing circulating water pumps for both primary and secondary circuits, including auxiliary pumps for each circuit.



SURIS
ELECTRICA

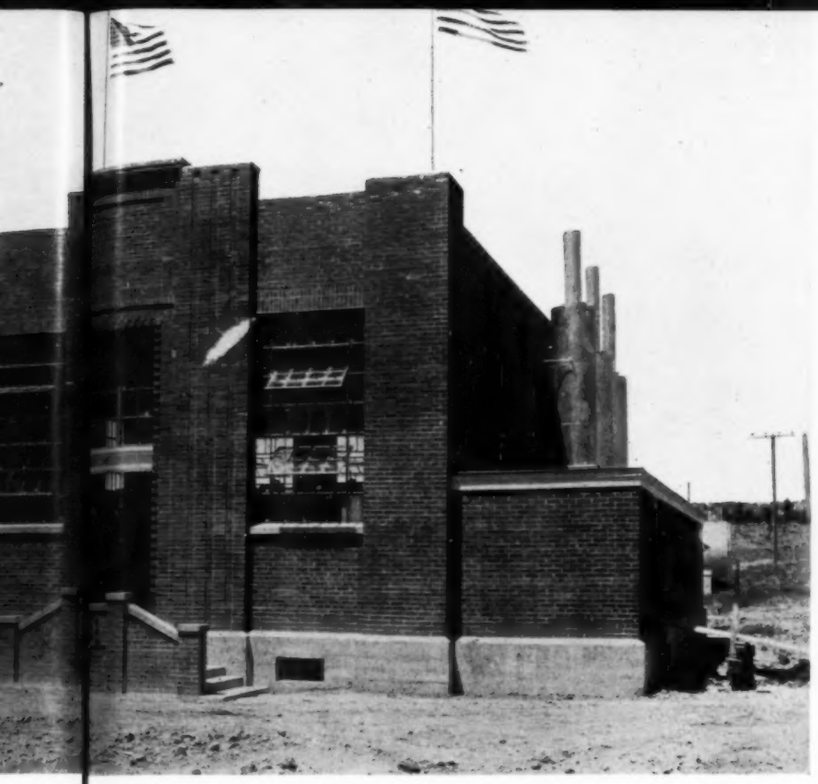
ras,

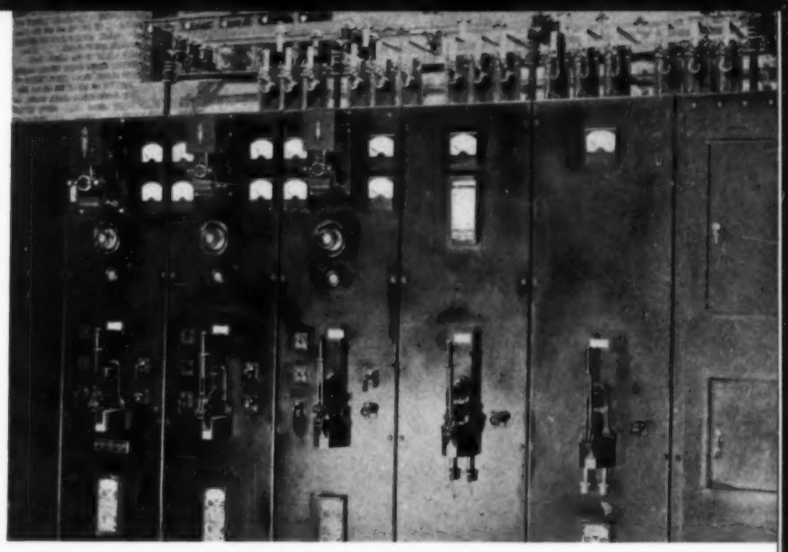
E. G.

THE Surprise Valley Electrification Corp. was incorporated on March 27, 1937. This is an REA project governed by seven Directors who are elected by the members of the Co-Operative. There is approximately 330 miles of primary line at 12,500 volts and about 20 miles of secondary line covering portions of Lake County, Oregon, and Lassen and Modoc County, California. At the present time plans are under way to build approximately 90 miles more of primary lines. This project is serving about 600 consumers with 400 probable customers to come on the present line.

The plant of the Surprise Valley Electrification Corp. at Alturas, California, consists of three Fairbanks-Morse Diesels; namely, a six cylinder, 450 hp., two cycle crankcase scavenging type with a 14-inch bore and 17-inch stroke delivering its rated power at an engine speed of 300 rpm.; a four cylinder, 300 hp. and a two cylinder, 150 hp. of identical construction. Each unit is equipped with a Woodward governor and Alnor pyrometer.

*Project Manager, Surprise Valley Electrification Corp.
†Chief Operator, Surprise Valley Electrification Corp.





Above — General Electric main switchboard and control panel.

URISE VALLEY
RIGATION PROJECT

ras, California

E. G. KEFFER *and* C. C. HICKS†

The alternators are directly driven from the engine's crankshaft and Link Belt silent chain driven exciters. Their output is 260 kw., 170 kw., and 82 kw. respectively, 3 phase, 60 cycles current at a potential of 2,400 volts.

The intake air for cylinder scavenging and charging is taken from the east wing, which extends out from the engine room. The scavenging air is filtered by American Air Filters.

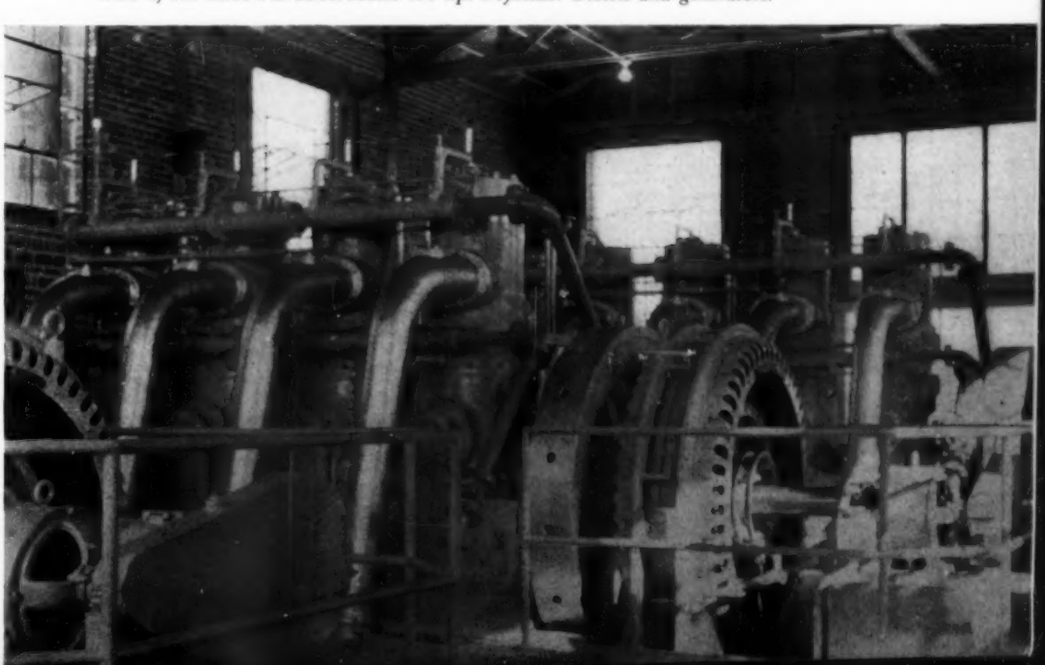
Directly below this wing, in the basement, the fuel oil day tanks for each unit are located. These tanks have a 300-gallon capacity and each tank is equipped with a hydrostatic level gauge and a meter. When filling, there is a Mercoid level switch in each tank which cuts off the transfer pump when full.

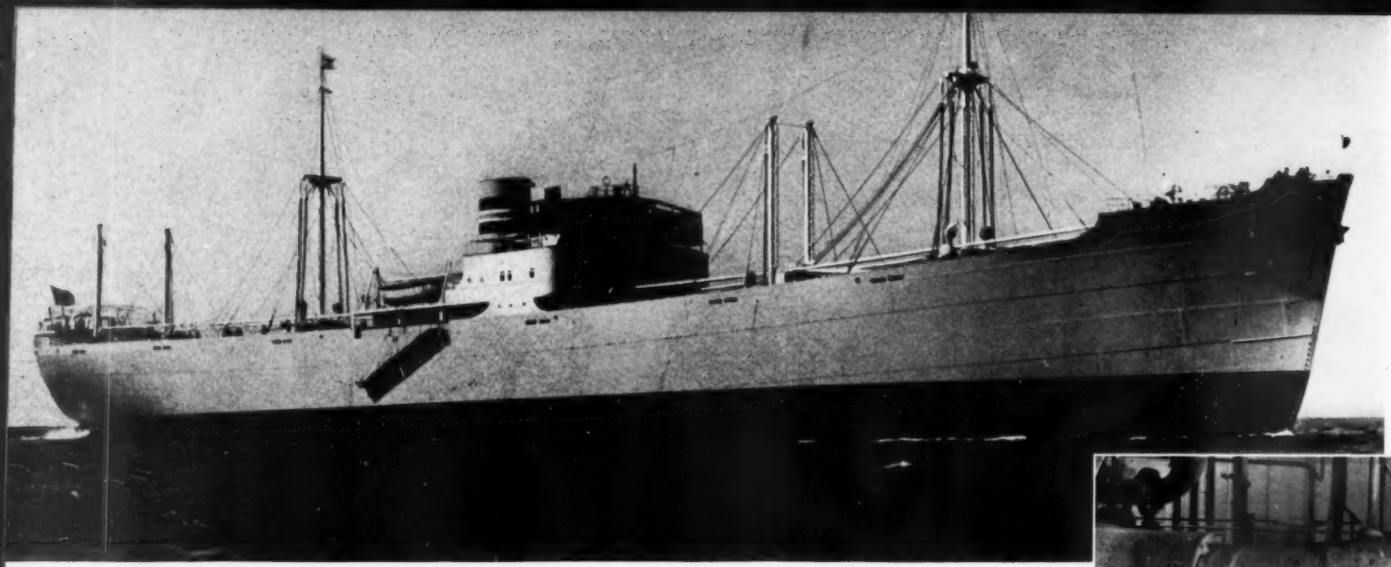
One lubricating system feeds all three engines. There are two 60-gallon tanks with new oil kept in one and old oil kept in the other. Oil from these tanks flow by gravity into a small tank which is connected to the oil line that feeds the engines. The proper oil level is maintained in a small tank by a float valve. The used oil that accumulates in the crankcase of the engines is returned by engine sump pump to a settling tank in the basement. This used oil is then cleaned by a Hydroil centrifugal purifier and returned to the lubricating system.

The circulating pump and heat exchangers of the enclosed water system are located in the west wing of the plant; the hot wells are in the basement and spray towers are directly in rear of building. There are four water circulating pumps in the system. One is connected directly in primary circuit and one is in secondary circuit. The other two are auxiliary pumps which can be used in either circuit.

The plant has a General Electric switchboard equipped with non-glare meters, voltage regulators for each unit, recording wattmeter, etc. The automatic alarm system is located on the switchboard. It is connected to the circulating water pumps, low water level in cooling system and low lubricating oil. Other auxiliary equipment also includes gasoline air compressor, hand fuel pump, and a 32 volt lighting system.

Two of the three Fairbanks-Morse 450 hp. 6-cylinder Diesels and generators.





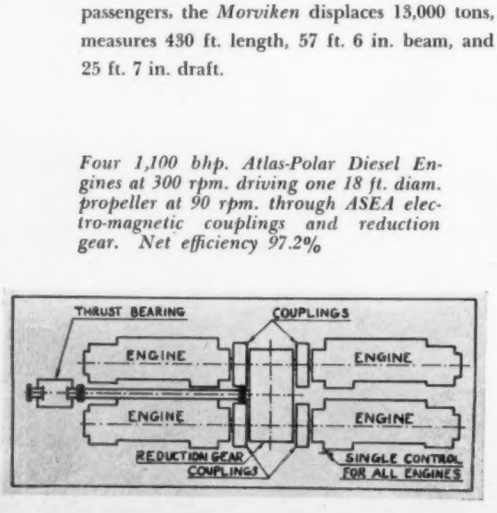
M/S "Morviken" equipped with four Atlas-Polar Diesel engines and ASEA electro-magnetic couplings and reduction gear to one shaft.

THE MOTORSHIP "MORVIKEN"

By WILBUR W. YOUNG

PLYING between Yokahama and New York, under a total of 4,400 hp. from her four Atlas-Polar Diesel engines, the *Morviken* has covered a total of 35,000 nautical miles since her launching in May last year. She has a cruising speed of 13.8 knots with a maximum speed of 16 knots, the four Diesels driving an 18 ft. four blade propeller through electro-magnetic couplings and a single gear reduction unit to a common shaft at 90 rpm. A modern freighter, with luxurious quarters for twelve passengers, the *Morviken* displaces 13,000 tons, measures 430 ft. length, 57 ft. 6 in. beam, and 25 ft. 7 in. draft.

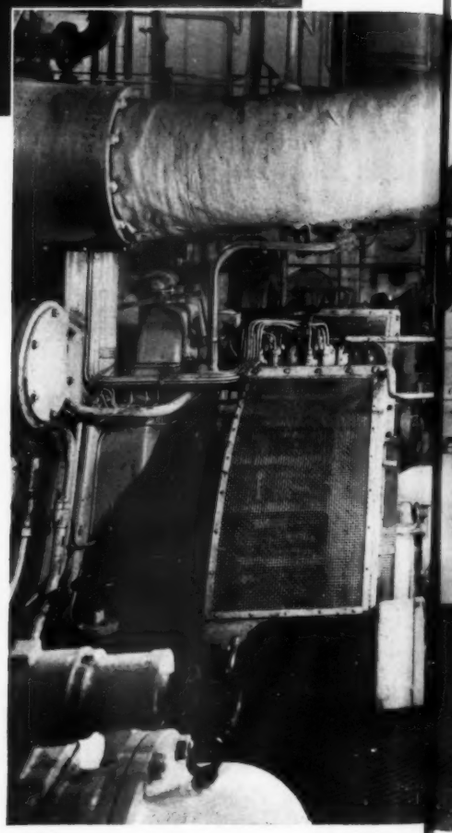
Four 1,100 bhp. Atlas-Polar Diesel Engines at 300 rpm. driving one 18 ft. diam. propeller at 90 rpm. through ASEA electro-magnetic couplings and reduction gear. Net efficiency 97.2%



Each of the four Diesel engines develops 1,100 bhp. at 300 rpm. They are 6 cylinder, 2 cycle, solid-injection engines with double acting scavenging air pumps built in. A two-stage starting air compressor is also built in above the scavenging air pump and both pumps are driven by the same crank off the end of the engine crankshaft.

The two-by-two and end-to-end arrangement of the four engines, with the four electro-magnetic couplings and single reduction gear unit between, leaves ample space in the engine room for auxiliaries.

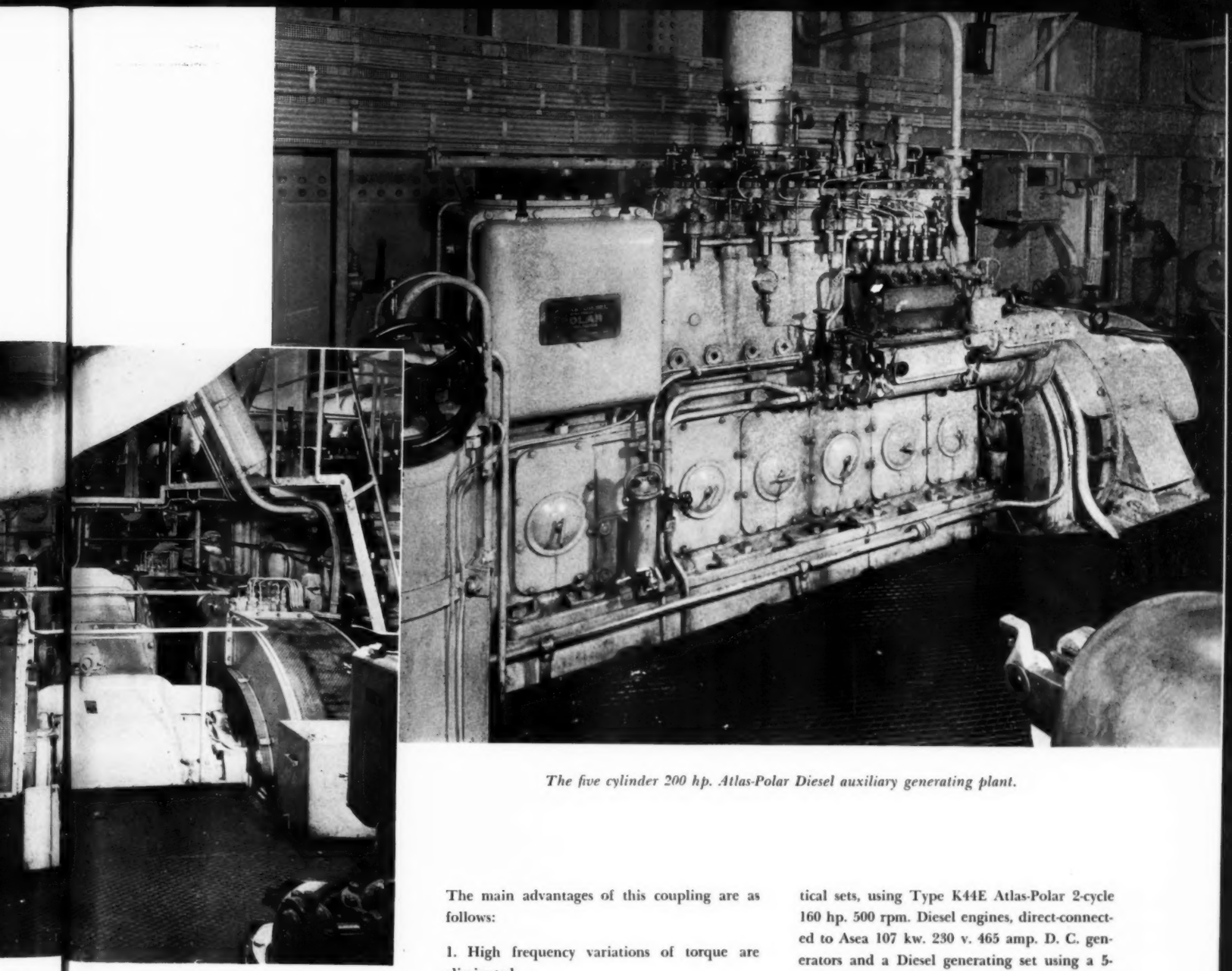
The advantages of high speed Diesel engines for marine propulsion in conservation of space and weight are well known. At the risk of repeating, let it be said, however, that these advantages also include low initial and low maintenance costs and smaller parts facilitate overhauling.



View showing reduction gear in center and the four electro-magnetic couplings which are built into the engine flywheels.

To adapt these higher speeds to marine service, speed reduction gear units have been perfected to a high degree of accuracy and dependability. Between the Diesel engine and the gear, it is necessary to fit a coupling designed for a slight amount of slip. The purpose of this coupling is to safeguard the gear from shocks and oscillations in the torque from the engines.

The electro-magnetic coupling, four of which are used on the *Morviken*, is manufactured by Allmanna Svenska Elektriska Aktiebolaget (ASEA), Vasteras, Sweden. It consists of two parts, one part rotating inside the other without any mechanical connection and with a



The five cylinder 200 hp. Atlas-Polar Diesel auxiliary generating plant.

radial clearance of ¼ in. to ⅜ in. One part is built as a multipolar magnet ring, the excitation for which is obtained by direct current through two slip rings; the other part is of solid iron with a non-insulated short-circuited winding. While running there is a certain slip between the two parts, and the full load torque from the Diesel engine is transmitted through the coupling at a slip of only about 1.2 per cent of the normal full speed of the engine. At a certain torque, the coupling reaches its maximum transmission power and the slip increases immediately thereafter up to 100 per cent. The net efficiency of this type of drive, allowing for slip, gear loss and excitation current, is above 96 per cent.

The main advantages of this coupling are as follows:

1. High frequency variations of torque are eliminated.
2. The coupling can be engaged or disengaged on load simply by actuating an ordinary electric switch.
3. The coupling is not subject to wear.
4. Owing to the great radial clearance, small faults in alignment can be allowed.
5. As the maximum torque is about twice the normal, the coupling acts as a safety device protecting the gear and the engine shaft against excessive stresses, if the propeller is suddenly stopped; e. g., by striking against an ice block, a quay wall, or similar obstructions.

The reduction gear is a double helical gear with 3.33:1 ratio. The inner parts of the couplings are mounted on both extensions of the two pinion shafts. The slow speed gear is located between the two pinion shafts.

The *Morviken's* auxiliaries consist of two identical sets, using Type K44E Atlas-Polar 2-cycle 160 hp. 500 rpm. Diesel engines, direct-connected to Asea 107 kw. 230 v. 465 amp. D. C. generators and a Diesel generating set using a 5-cylinder 2-cycle 200 hp. 500 rpm. type K45E Atlas Polar Diesel engine, direct-connected to 134 kw. 230 v. 584 amp. D. C. generators. Duplicate starting air compressors, Atlas Type LPK4 25 kgs. cm.² are direct-connected to 220 v. 630 rpm. Elektromekano motors, two centrifuges for fuel and lube oil, motor-driven fuel and lube oil pumps, lube oil cooler, and a small Atlas-Polar one-cylinder Diesel-driven emergency air compressor. All four engines are maneuvered from either of two duplicate stations. The controls are two indexed levers, one for fuel and the other for air.

Morviken is typical of thirteen Scandinavian owned vessels built in the last two years with a total of 33,340 bhp. installed. All of these ships are powered with Atlas-Polar Diesels, driving through electro-magnetic couplings and reduction gears.

COOPER-BESSEMER WILL FURNISH EIGHT LOCOMOTIVE DIESELS

IN the form of two orders, General Electric Company has recently contracted with The Cooper-Bessemer Corporation for furnishing eight 500 hp. Diesel locomotive engines. Two of the latter company's Type GN 6-cylinder Diesel engines will generate power in single-engined, Diesel-electric locomotives to be built for the Mexican government. Six engines of this same type will go into twin-engined, Diesel-electric, switching and transfer locomotives for the Ford Motor Company.

The two 500 hp. locomotives destined for Mexico will serve first as work train locomotives upon the government's Southeastern Railroad, now in process of construction. This road, when finished, will connect the Gulf cities of Campeche and Puerto Mexico and also form a connecting link between the existing rail lines of the National Railways of Mexico and United Railways of Yucatan. The new link completed, the Diesel-electric locomotives will go into switching and transfer service.

The three 1,000 hp. locomotives for the Ford Motor Company will be almost exact duplicates of its two streamlined units which gained so much attention slightly more than a year ago. They are intended for switching and transfer service at the company's River Rouge plant.

A NEW TANKER

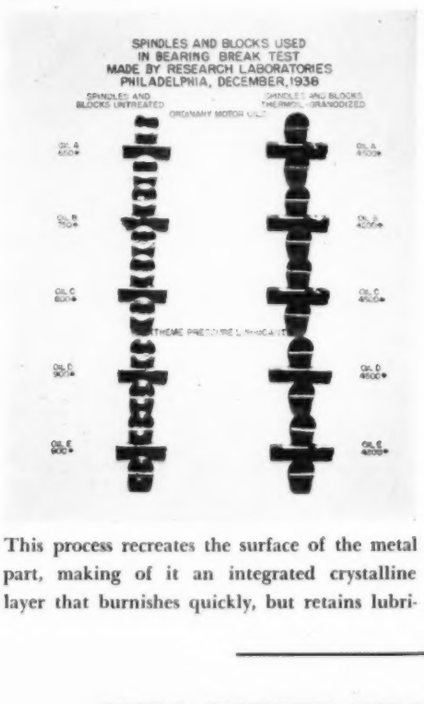
THE Petroleum Navigation Co., through its consulting naval architect, Carl J. Nordstrom, put out bids last month for a small tanker 140′ x 27′ x 13′ to be driven by a 480 hp. Diesel engine. The Commercial Iron Works of Portland, Ore., was the low bidder on the hull and the Washington Iron Works of Seattle, Wash., the low bidder on the engine. The capacity of this tanker is to be 145,000 gal. in eight cargo tanks. It will have a service speed, loaded, of nine knots and will have a displacement of approximately 900 tons. Operation will be on Puget Sound and British Columbia waters. It will have a cruising radius of 3,000 miles and will be of all-welded steel construction.

AGENCY WANTED

J. M. CUMMINGS, machinery agent in Honolulu, Hawaii, has asked us to put him in touch with manufacturers of Diesel engines, both stationary and marine, with a view toward arranging an agency contract.

THERMOIL GR

NATURALLY the makers of Diesel engines are interested in anything that will reduce wear on friction surfaces. Witness the different metals and alloys employed, the different lubricants used, and the varying degrees of finish recommended for such surfaces. Recently a new and effective means of avoiding the dangers of the break-in period, as well as excessive later wear, has been developed by the American Chemical Paint Company, in a unique phosphate coating produced by a solution called Thermoil-Granodine.



This process recreates the surface of the metal part, making of it an integrated crystalline layer that burnishes quickly, but retains lubri-

TWO DIESEL TRAIN OR M

***Streamliners, Allowed* urt, to**

ST. LOUIS. – Purchase by the Missouri Pacific Railroad of two streamlined trains and other equipment at a cost of $4,623,000 was authorized by Federal Judge George H. Moore.

The trains, to cost $672,000 each, are intended for operation between St. Louis, Kansas City and Omaha on a nine-hour schedule. The present running times are eleven and one-half to thirteen and one-half hours.

Each train will consist of a 2,000 hp. General Motors Diesel locomotive, a mail-baggage car, a mail-storage express car, two coaches, a diner-

GRANODINE

cants and decreases friction and wear to an absolute minimum. Scuffing, scoring and seizing do not occur. Moreover, the process prevents corrosion.

In regular production Thermoil-Granodine has proved highly effective on Granoseal piston rings, on camshafts, tappets, and other bearing surfaces. Tests made on rings show from five to twenty times as much wear on untreated rings as on treated ones. In Faville-LeVally break tests, Granodized spindles and blocks withstood, without failure, pressures from five to seven times as great as the pressures at which untreated parts seized and broke. In fact, the Granodized parts ran without failure to the limit pressure of the tester. It is not known how much more pressure they might have stood.

Many applications of Thermoil-Granodine are possible. Pistons and rings should be treated, also camshafts, rocker arms, sleeves, tappets, gears, and other rubbing surfaces. Used on such parts the process effects economies in oil, in finishing operations, in metal, and through the elimination of failures. It is, too, a process low in cost, and simple in execution. The cleaned metal parts are immersed in a heated solution of Thermoil-Granodine for the short time necessary to create the coating, then rinsed and dried. If desired, a coating of oil, or an emulsion of soluble oil, may be applied. These are the essentials of the process. They can be performed by a non-technical workman.

OR MISSOURI PACIFIC

rt, to Cost $672,000 Each

cocktail lounge car and a parlor observation car. Delivery of the trains is expected in from six to eight months after the orders are placed.

L. W. Baldwin, chief operating officer, testified at a hearing before Judge Moore that the new equipment would bring an increase of $175,000 annually in revenues and effect an annual economy of $103,000 in operating expenditures.

Other equipment authorized included two $99,000 Diesel locomotives to be used between Union and Lincoln, Neb.; five Diesel switch engines costing $63,000 to $85,000 each and 1,000 flat-bottom coal cars.

THE DU PONT BUILDING

. . . . *Continued from page 25* . . . .

the pistons and liners. One of the unusual features of this big plant is that the engines were assembled in the factory in Cleveland, tested and loaded on the freight cars, shipped to Miami, unloaded and skidded onto the foundations without being disassembled.

It is well to note that the three main engines and the auxiliary engine are mounted on Hussman Spring Mountings. Due to the particular condition of the foundation and the fact that the footings for the major portion of the building had been installed prior to the engine foundations, it was deemed necessary to install Hussman Spring Mountings rather than disturb the cap rock adjacent to the existing footings. Actually the main engines are mounted entirely on the springs, which in turn rest on a concrete slab 2½ ft. deep—this constitutes the entire foundation for each engine, thus, materially reducing foundation cost and compl tely isolating machinery vibrations from the rest of the building.

Naturally, the elevator equipment in a modern building of this type has a very definite effect on the Diesel power plant from which it receives the necessary power. In the Alfred I. duPont Building there are six high-speed 750 foot-per-minute Otis elevators, each equipped with its individual 30 kw. motor generator set. Then, there is a smaller elevator serving the bank and also a general purpose freight elevator. A 10 kw. motor generator set serves these two units. The maximum demand when all elevators are in service is 190 kw. Because of the ample capacity of the Diesel power plant, no special arrangement has been made for handling the surge from the elevators and, in actual practice, no trouble has been experienced in maintaining voltage regulation within the necessary limits to avoid light flickering.

Some of the outstanding features of the building itself are of interest: Venetian blinds will be found in every office. There is a connecting garage service for the convenience of its tenants and the building is unique in having the highest wind resistance of any steel frame building heretofore erected in this country. The building line on Second Avenue Northeast is set back 10 feet from the original property line so as to provide for widening the street, and there is a new 12 foot sidewalk along the Second Avenue side of the project which will greatly improve travelling on this side of the street and will increase the importance of this block as a shopping center.

The fourth, fifth, and sixth floors have been designed for doctors and dentists, provision having been made to supply hot water, gas, and compressed air; and above this there will be general offices for all types of business. The additional development adjacent to the main building consists of a 30 foot store on Flagler Street by 95 feet deep, with ceiling and mezzanine to conform with the ground floor stores in the Alfred I. duPont Building proper. The space above this store will provide a permanent air and light well between the main building and the adjacent property.

In many ways this is one of the most important descriptive articles ever to appear in DIESEL PROGRESS. This installation will effect a radical change in the application of Diesel engines to office and factory buildings. Too much emphasis cannot be placed on the compactness of this installation, on the fact that all engines are electrically started, and on the fact that all engines are spring mounted. All in all, the duPont Building represents the most important and interest-arousing application of Diesel engines this year.

ONE of the most unusual Diesel vessels to be completed recently is the little shallow draft tug boat *Taku Chief*. It is twin-screw, shallow draft, tunnel-sterner of unusual construction.

The new craft was launched practically complete and ready for the journey north, at the plant of Olson & Sunde marine works on the Lake Washington Canal in Seattle. She was desiged by H. C. Hanson of Seattle, who has over 100 special types of Alaska craft, practically all of them Diesel-engined, to his credit.

The *Taku Chief* is of 60 ft. overall length, 18 ft. beam, and 5 ft. depth. She carries 7 tons of cargo on a 24 in. draft. The vessel is heavily constructed of sawn Douglas fir, and has two longitudinal steel trusses running throughout her entire length for stiffening and additional strength to permit operation on but two feet of water. Her power plant consists of two 125 hp. 6-cylinder Cummins Diesel engines driving propellers entirely enclosed in steel tunnels. A special steel jacket around these twin tunnels permits cooling the engines with a closed fresh water circuit, the tunnel jackets acting as heat exchangers.

The small engine room has a 300 gallon Diesel fuel tank and an Exide battery set supplied with current from twin generators operating

off the main engines. She has three separate rudders and carries a neat galley and quarters for a crew of five on the main deck.

Her owners, the Polaris-Taku Mining Company of British Columbia, will operate her to push two 76 ft. steel oil barges up the Taku River, a distance of about 35 miles between the Alaska Panhandle and the British Columbia interior.

On her first trip to Alaska, loaded with freight, she developed about 12 knots at full power.

ATCHISON ORDERS 30 DIESEL LOCOMOTIVES; OTHER PURCHASES DUE

DIRECTORS of Atchison, Topeka & Santa Fe Railway have approved a budget appropriation for 1939 for capital improvement of over $18,000,000, including a carryover from the 1938 budget of approximately $12,500,000 for items on which no work has been done, or where begun were not completed by the end of 1938.

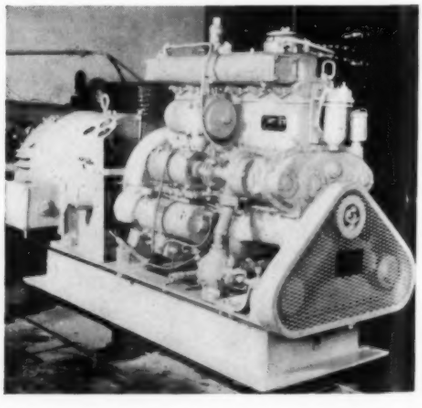
Directors also authorized the purchase of 30 new Diesel electric switching locomotives, some of 600-horsepower and some of 900-horsepower. It is estimated that these will probably cost upwards of $2,250,000.

It was also announced that purchase of additional equipment will be considered later.

HERCULES DIESEL ENGINES FOR MARINE GENERATOR APPLICATION

A RAPIDLY developing field for Diesel Engine application is seen in the increasing popularity of self-contained Diesel-marine generator sets. Because of their compact design and smooth, vibrationless operation, Hercules Diesel Engines are making an important place for themselves in this specialized field.

A very interesting application of this type is shown in the accompanying photograph of a Reiner Vibrationless Diesel Marine Generating



Set, built by John Reiner & Company, Inc., of New York City equipped with Korfund dampeners and installed by the Marine Basin Company on the yacht "Elfreda" which is owned by Mr. H. B. H. Ripley of New York.

The engine shown is Hercules Diesel Model DRXB, 4⅜" x 5¼"—direct connected to marine type, ball-bearing, drip-proof generator.

MARINE TRANSIT BUYS

THE Marine Transit Co. is having built by the Manitowoc Shipbuilding Co., Manitowoc, Wis., a 200 gross ton steel tug boat 100′ x 25′ x 8′ which is to be powered with a 600 hp. Diesel engine, make not selected as we close for press.

CURTIS BAY BUYS TWO

THE Curtis Bay Towing Company of Baltimore has contracted with Pusey and Jones Corporation to build two new tug boats, each of which will be powered with a 300 hp. Enterprise Diesel engine.

BOLINDERS TO SELL ATLAS-POLAR DIESEL ENGINES

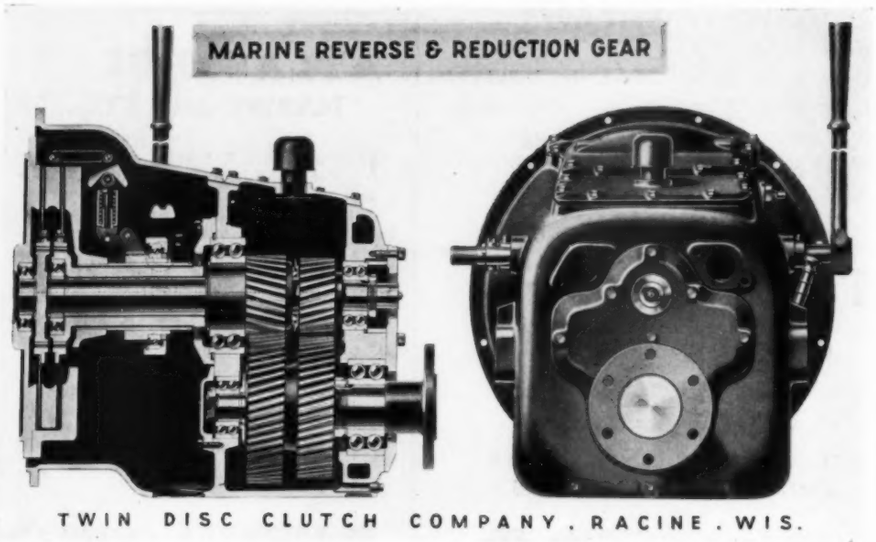
THE Atlas-Polar engines, which have been built by A. B. Atlas Diesel, Stockholm, Sweden, since 1898, are now being offered in the United States through Bolinders Company, Inc., New York. Bolinders Company has been selling their own line of Diesel engines in the United States and adjacent countries since 1914. With the addition of Atlas-Polar engines, they can now offer a complete line of Diesels from 6 hp. to 1,500 hp.

MARQUETTE CEMENT BUYS

THE Marquette Cement Mfg. Co. of Chicago, who some months ago placed a contract with T. R. Tarn, naval architect at Pittsburgh, to design a twin screw, tunnel stern river tow boat, has now ordered such a vessel from the Marietta Mfg. Co. The new vessel will be 124′ x 26′ x 10′ and is to be powered with a pair of 6-cylinder 13″ x 16″ 380 hp., 275 rpm. Atlas Imperial Diesel engines. This boat will be named the *Nicholas Duncan* and will be used on the Illinois River.

CARD BUYS ONE

CARD TOWING COMPANY of New York has contracted with the Canulette Shipbuilding Co. of Slidell, La., to build a Diesel-propelled tug boat 111′ x 25′ x 13′. This new tug boat will be powered with a 6-cylinder, 4-cycle, 16¾″ x 26″ General Motors Diesel, 875 hp. at 250 rpm.



THE Twin Disc Clutch Company of Racine, Wis., who has been very successful in recent years in developing a series of 100 per cent reverse gears, has recently put into full production a reverse and reduction gear suitable for engines of 200 hp.

In this new size are included all the features which have proved so successful in the smaller sized gears and the new larger model supplements the standard line so that the following models are now available: The Model MG-61 for engines ranging from 50 hp. at 1,000 rpm. to 70 hp. at 1,800 rpm.; Model MG-125 for engines ranging from 70 hp. at 900 rpm. to 140 hp. at 1,800 rpm.; Model MG-161 for engines ranging from 100 hp. at 900 rpm. to 200 hp. at 1,800 rpm., and Model MG-200 for engines ranging from 100 hp. at 600 rpm. to 215 hp. at 1,200 rpm.

In all models the forward and reverse clutches as well as the reverse and reduction gears are enclosed in a one-piece housing. Continuous operating in reverse without over-heating or excessive wear is assured by the use of clutches of equal size and capacity for both "forward" and "reverse."

The clutches are of the dry plate spring loaded over center type which eliminates the necessity for any adjustments to compensate for the wear of the friction surfaces. The clutch action provides for a positive over-lock in both forward and release positions which prevents accidental engagement or release with no sacrifice of the smooth easy shifting.

The reverse and reduction gears proper are separated from the clutches by a partition in the housing. This prevents any possibility of the oil in which the gears operate from getting to the clutches.

Only five gears are used in the entire mechanism. Two of the gears are under load when operating in "forward" and three when operating in "reverse." The shaft for driving the forward gear train is hollow and within it is positioned the shaft for driving the "reverse" gear train. The function of the extra gear in the reverse gear train is to change the rotation direction of the drive shaft.

A positive "neutral" pervents accidental clutch engagement. When the shift is made from forward to reverse the forward clutch and its corresponding gears are automatically disengaged and vice versa.

All gears are carbonized, hardened and ground both in the bore and the gear teeth to insure long life and continued quiet operation. Heavy duty ball bearings are used throughout. All action parts are precision finished and hardened and ground as required.

Twin Disc reverse and reduction gears are available with gear ratios of 1 to 1, 2 to 1, and 3 to 1, with a horsepower range of 40 hp. to 215 hp. at engine speeds of from 600 rpm. to 1,800 rpm.

Units rated at 100 hp. and up can be furnished with hydraulic finger tip control. For pilot house control or multiple station control of the hydraulically controlled units, cables as small as ⅛ in. in diameter are sufficient.

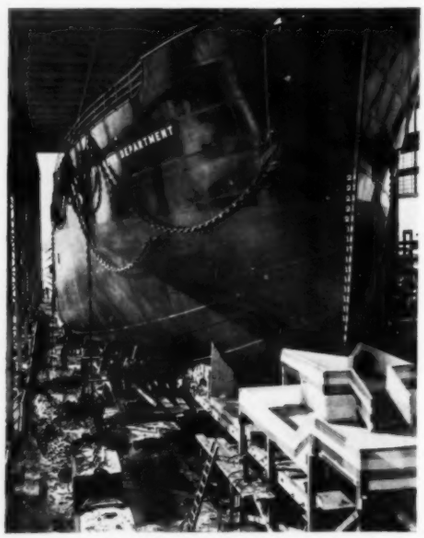
The manufacturer claims that these new gears with their fast easy shifting and 100 per cent reverse feature give the maximum in safety and maneuverability.

DIESEL PROGRESS

INDEX OF ADVERTISERS

"CHESTER HARDING" LAUNCHED

LAID down May, 1938, and launched on January 20, the United States Engineer Department's latest all-Diesel sea-going hopper dredge, *Chester Harding*, is nearing completion at the shipyard of The Pusey and Jones Corporation where she will be outfitted for delivery next spring as the 17th steel ship to be built for the War Department by that firm since the first one was constructed for the Quartermaster General at Wilmington, Delaware, in 1871. The



Ready for the launching.

new 4,000 ton steel ship is named after the late Brigadier General Chester Harding, Governor of the Panama Canal from 1916 to 1920; she is of riveted construction, 308 feet long, 56 feet beam, with a load draft of 20 feet and has a hopper capacity of 2,500 cubic yards. When loaded she will displace 7,000 tons. She is powered with two 1,000 bhp. solid injection direct-reversing Busch-Sulzer 8-cylinder four-cycle Diesel engines, direct-connected to the propeller shafts and installed in an engine room located midships. An adjacent machinery space, separated from the engine room by a watertight bulkhead, contains the dredge pump machinery, consisting of two 22 in. centrifugal pumps, each driven by 650 bhp., 6-cylinder Cooper-Bessemer Diesel engines of the solid-injection non-reversing type, positioned athwartship with connected and independent auxiliaries so located as to allow ample free space and headroom. These engines turn the pumps at 250 rpm. Electric power is furnished by a 400 kw., 250 volt, direct current, Westinghouse generator coupled to a third Cooper-Bessemer Diesel engine of the 8-cylinder type, equipped for solid injection and rated at 600 bhp. at 450 rpm. A 75 kw. stand-by generator of Buda manufacture will supply 250 volt current for port use. All Diesel machinery is cooled by a common closed water circulation system having heat exchangers capable of 5,550,000 btu. heat transfer per hour. Three 10 hp. electric powered Nash centrifugal pumps are selectively arranged in this system for lifting fresh water from the engine room double bottom tanks and circulating it through the several engine jackets, heat exchangers, and oil coolers.

The main engines represent the initial attempt of the U. S. Engineer Department to provide direct Diesel drive propulsion in a sea-going dredge, and shop trials point to the successful low speed operation initially anticipated by Mr. Hugo Haas, Senior Engineer, who is responsible for the ship's machinery design conception. At full power, the main engines will turn the 7 ft. 8 in. diameter, four bladed propellers 250 rpm., which should offer excellent maneuverability as well as low fuel consumption. The shipbuilder has developed a unique control station, which, besides offering a remote hydraulic control for the propelling engines, centralizes the instruments for all four engine room Diesels on a series of indirectly illuminated panels arranged in planes perpendicular of the operator's vision in the middle of the station. The repeaters, telephones, loud speaker,

The Launching of the "Chester Harding."

and air controls are also concentrated within easy reach of the operator and the entire station is designed in the modern simplicity, decorated with stainless steel and having double built-in log desks.